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MIDWESTERN BUSINESS AND ECONOMIC REVIEW

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Table of Contents

ABSTRACTS

LAGS IN PRODUCTION AND CONSUMPTION IN A NEOCLASSICAL GROWTH MODEL

Production takes time, obviously, but this idea wasn't part of the macro toolkit until Kalecki's work, and its subsequent rediscovery by Kydland and Prescott in their Time-to-Build (TTB) paper. TTB has been found to yield oscillatory growth paths in various settings. The separate idea that we gain utility from increases, rather than simply levels of, income was also plausible, and yet wasn't included in macro models until relatively recently. Both streams of research rely on lags, one in the production function, and the other in the utility function. This paper aims to merge these streams in a simple neoclassical growth model. We derive closed form solutions for the steady state level of capital. We also provide simulations that illustrate the effect of production and consumption lags on the transition path.

ESTIMATING THE FIRM DEMAND FOR MONEY USING DISAGGREGATED DATA

Using firm-level data aggregated into a "typical firm" leads to conclusions that differ from those when the underlying firm-level data are used. The magnitudes of the scale elasticities increase with the level of aggregation. Economies of scale are found only when using firm-level data which include multinational firms. Unitary elasticities are found for Brazilian firms and any sample using aggregated data. Behavioral differences are attributed to Brazilian firms' need to self-finance their investment spending. This suggests that improvements in the financial system could speed economic development by releasing more cash balances for productive investment opportunities.

SYSTEMATIC RISK IN SELF-INSURANCE GROUPS FOR WORKERS' COMPENSATION LOSSES

This paper examines the rate stability of group self-insurance for workers' compensation (WC) liability in Virginia. Self-insurance groups, like mutual organizations, are owned by the members they insure. This risk pooling arrangement serves as a risk transfer alternative to conventional insurance. Based on the financial data of group self-insurance associations in Virginia, this study suggests that self-insurance groups do not provide their members with the benefit of stable WC rates. However, the ownership structure of self-insurance groups can partially insulate participating employers from the volatile commercial WC market because the price volatility within self-insurance groups is not caused mainly by systematic risk.

STRATEGIC PRICING DECISIONS FOR SMALL RETAILERS: CONTRIBUTION MARGIN PRICING

Contribution Margin Pricing is a suggested mindset in which a retailer may view the price of a product and the costs associated with this product in a different perspective. Rather than following a standard markup procedure, i.e. 35% or 50%, contribution margin pricing suggests a means by which a retailer can set prices even below the usual markup, and still would be able to contribute profit to the firm's bottom line. The key to this concept is fully understanding the price/variable cost relationship associated with a product and the degree to which the firm is beyond its break even point and has unused capacity, i.e. available shelf space. Although this concept has been theoretically developed prior to this writing, many retailers do not grasp its significance. Once understood, small retailers may use this contribution margin pricing strategically to acquire new customers, establish new markets, or retain existing customers. Cautions in the use of this technique and suggestions on how it can be used in market segmentation are also addressed.

TOWARD UNDERSTANDING INVESTMENT DECISIONS AND THE IMPORTANCE OF FINANCIAL ACCOUNTING IN THE ROARING TWENTIES

This study examined books on investing published in the United States in 1926 and the role of financial accounting in the prescribed investment practices. The reviewed books, just three years short of the 1929 stock market crash, recommended a diversified portfolio for investors that included both stocks and bonds. They also suggested key ratios and earnings information that should be considered when making investment decisions. Unfortunately, the necessary information was not always available to investors, which undoubtedly contributed to losses in the coming crash.

GOLDRATT'S THEORY APPLIED TO THE PROBLEMS ASSOCIATED WITH AN ACCOUNTING FIRM GOING PAPERLESS

Many problems exist when an accounting firm is trying to go paperless. By using Goldratt's theory, some solutions were created to make going paperless less difficult/problematic. The first step is to create a ***Current Reality Tree***. This tree will illustrate how all the problems are connected to each other. Once, the ***core problem*** have been identified, an ***Evaporating Cloud*** can be created to illustrate what is needed to keep the firm, staff, and clients happy. The next step is to create a ***Future Reality Tree***. This tree will illustrate how the solutions can change every problem with going paperless into a positive statement. This theory demonstrates that there is a process to solve every problem.

LAGS IN PRODUCTION AND CONSUMPTION IN A NEOCLASSICAL GROWTH MODEL

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INTRODUCTION

Realism has recently been inserted into macroeconomics along two margins: in the utility function and production function. The award of the 2002 Nobel Prize to Vernon Smith and Daniel Kahneman, for example, marked the respectability of using more realistic psychological assumptions in our utility functions. The recent "Habit formation" literature (and its cousin, "Keeping up with the Joneses") is among these. Kydland and Prescott's (1982) "Time to Build paper", and their subsequent Nobel Prize in 2004, marked the reintroduction of a more realistic time dimension in production functions. Both Habit Formation and Time-To-Build rely on the fact that lags are important. Habit Formation claims that one's current utility is a function of how much more a person is consuming relative to some benchmark—perhaps last period's level of consumption. TTB technology relies on the fact that current output is a function of lagged capital stock—perhaps last year's level. Clearly there are similarities between these two literatures.

Another similarity between the two literatures is that lags affect the incentives to invest. In the TTB literature, investment is converted to productive capital, and ultimately to consumption, only after a delay. There is a similar phenomenon at work regarding habit formation. Under habit formation, the implication of the agent's preoccupation with current growth, we shall see, is that investment gets deferred so that convergence to the steady state is delayed.

To our knowledge, no one has synthesized these strands. Moreover, the models that have been developed to address these two strands separately are unnecessarily complicated. This paper combines both strands into one tractable, understandable, model.

LITERATURE REVIEW

The landmark paper by Kydland and Prescott (1982) introduced two innovations to macroeconomics. The first was analytic: they re-introduced Kalecki's (1935) idea that production takes time. The second was methodological: they introduced calibration and simulation to macroeconomics. This second innovation was necessary, as they were estimating the time-series implications of random productivity shocks within an analytically intractable model. Models with TTB production functions that yield tractable and analytical solutions have been scarce. This paper fills that gap.

Habit formation represents a second important innovation in macroeconomics. Clearly, it corresponds to "adaptation theory" or "habituation theory": people seem to revert to their own idiosyncratic levels of happiness, irrespective of their level of income, but people also are happier when their incomes are rising. For example, lottery winners are immediately much happier, but over time become habituated to their increased standard of living (Brickman, Coates, and Janoff-Bulman, 1978)[1]. Modeling the implication of this—that utility depends upon the change in income rather than its level—has also been a challenge.

Ryder and Heal (1973) augmented a neoclassical growth model with habit-forming preferences, in order to investigate the transitional dynamics to the steady state. Later, Carroll, Overland and Weil (1997 and 2000) incorporated simple habit formation in an even simpler endogenous growth model, the AK model. Their papers are similar to ours in that we, too, examine transitional dynamics of habit, but rather than using a simple AK model, or even a simple neoclassical growth model, we merge this stream of literature with the time-to-build production function of Kydland and Prescott.

Of the more recent papers on the subject, Alvarez-Cuadrado, Monteiro, and Turnovsky (2004) is perhaps the most cited attempt at introducing habit formation into neoclassical and AK growth models. Since the agents optimize over the level *and* the rate of growth of consumption (and output), this affects the speed of convergence to the steady state level of output.

Alonso-Carrera, Caballe and Raurich (2005) restricted their attention to the "Sobelow" type of endogenous growth model. This production function is the linear sum of an AK model with another that has diminishing marginal product of capital. They examined multiplicative habit formation and showed that the equilibrium converges to a balanced growth path. Habit formation was found to increase the long run rate of growth, however, the transitional dynamics depend upon the specification of the production function. Carroll (2000) provided a general, and simple, derivation of the properties of multiplicative habit formation models with endogenous growth.

The idea that lags in production might generate cycles dates back to Kalecki (1935). The generalizability to a general equilibrium framework, however, was an open question until the late 1990s. Asea and Zak (1997) and Zak (1999) showed that the Time-To-Build (TTB) technology is inherently oscillatory within a neoclassical growth context—in fact, chaotically so. The proof relied upon the analysis of functional, and delay, differential equations. Szydłowski and Krawiec (2004) generalized the TTB and neoclassical growth model of Zak (1999), also showing the existence of chaotic cycles. Kaddar and Alaoui (2008) further

investigated Szydłowski and Krawiec's (2004) model, also finding that chaotic behavior characterizes their TTB model. The conclusion being, apparently, that complicating an already complicated model doesn't simplify its conclusions. Bambi (2008), on the other hand, examined TTB in the context of an AK endogenous growth model. Relying on an obscure solution method of functional analysis, the D-subdivision method, he showed that there exists a balanced growth path, but that the path to it is oscillatory. In general, the conclusion seems to be that the introduction of time delays in the production function (TTB) results in solutions characterized by delay-differential equations. This makes the solutions unstable.

Unfortunately for students of economics, the solution methods are often outside the skill-set of even professional mathematicians. What is needed is a way to merge these two new strands in economics – TTB and Habit Formation – in a standard growth model (neoclassical growth), that has analytic solutions.

THE MODEL

The Utility function which we are maximizing is:

$$\max_{c_t} \sum_{t=0}^{\infty} \beta^t \left(\mu \ln c_t - \ln c_{t-1}\right) \quad (1)$$

where $\mu \geq 1$. The utility function is a standard log-utility, except that utility also depends upon the previous period's consumption. Moreover, current utility favors current consumption over previous consumption by a factor μ. When μ=1, then current utility depends only upon how quickly our rate of consumption is changing. That is, we care only whether our consumption is more than before. Thus, μ=1 corresponds to the case of pure habit formation. When $\mu > 1$, then the level of consumption matters, as well as the rate of change of our consumption. The greater is μ, the more the current *level* of consumption matters toward overall utility. This has implications for the growth path of the economy: the increased marginal utility of today's consumption means that agents can increase their investment expenditure. Thus, habit formation implies a slower rate of convergence to the steady state.

Output is given by a Cobb-Douglas production function:

$$Y_t = AK_t^{\xi} N_t^{1-\xi} \quad (2)$$

where K is the stock of capital used in production, and N is the population of labor. The law of motion for capital is:

$$K_{t+1} - K_t = I_t - \delta K_t \quad (3)$$

Output is either consumed or saved, so that:

$$Y_t = C_t + S_t \quad (4)$$

but investment at time t is determined by savings d periods ago—there is a "gestation lag" to investment. That is,

$$I_t = S_{t-d} = Y_{t-d} - C_{t-d} \quad (5)$$

so that, by substitution,

$$I_t = AK_{t-d}^{\xi} N_{t-d}^{1-\xi} - C_{t-d} \quad (6)$$

In this way, we introduce time-to-build technology. It takes $d+1$ periods for deferred consumption to become productive investment (that is, to enter into the production function).

Further, we assume that the population grows at an exogenously given rate η so that

$$N_t = N_{t-1}(1+\eta) = N_{t-d}(1+\eta)^d \quad (7)$$

Substituting (7) into the law of motion (3), we get:

$$K_{t+1} - K_t = AK_{t-d}^{\xi} N_{t-d}^{1-\xi} - C_{t-d} - \delta K_t \quad (8)$$

We can normalize aggregate output Y_t into per-capita output y_t by dividing by N_t. (We shall follow the usual convention and let lower case letters refer to per-capita variables.) Thus,

$$\frac{K_{t+1} - K_t}{N_t} = \frac{AK_{t-d}^{\xi} N_{t-d}^{1-\xi} - C_{t-d} - \delta K_t}{N_t} \quad (9)$$

Recognize that

$$\frac{K_{t+1}}{N_{t+1}} = \frac{K_{t+1}}{N_t(1+\eta)} \quad (10)$$

so that by cross-multiplication, equation (1) can be expressed as:

$$\frac{K_{t+1}}{N_t} = \frac{K_{t+1}(1+\eta)}{N_{t+1}} = k_{t+1}(1+\eta) \quad (11)$$

or, in general:

$$\frac{K_{t+d}}{N_t} = k_{t+d}(1+\eta)^d \quad (12)$$

After substitution, equation (9) can be expressed as:

$$k_{t+1}(1+\eta) - k_t = Ak_{t-d}^{\xi}\left(\frac{1}{1+\eta}\right)^d - \frac{c_{t-d}}{(1+\eta)^d} - \delta k \quad (13)$$

We can solve (13) for c_{t-d}, and update by d periods so that current consumption is:

$$c_t = Ak_t^{\xi} + k_{t+d}(1-\delta)(1+\eta)^d - k_{t+d+1}(1+\eta)^{d+1} \quad (14)$$

In order to maximize the utility function, we can substitute the above expression into the utility function and differentiate. Alternatively, we construct a Bellman equation, such that:

$$V(k_{t+d}) = \max_{k_{t+d}} U(k_{t+d}, k_{t+d+1}, k_{t+d-1}) + \beta V(k_{t+d+1}) \quad (15)$$

Differentiating the Bellman equation with respect to k_{t+d} yields:

$$\frac{\partial V(k_{t+d})}{\partial k_{t+d}} = \frac{\mu(1-\delta)}{-k_{t+d+1}(1+\eta)+k_{t+d}(1-\delta)+Ak_t^{\xi}\left(\frac{1}{1+\eta}\right)^d} + \frac{1+\eta}{-k_{t+d}(1+\eta)+k_{t+d-1}(1-\delta)+Ak_{t-1}^{\xi}\left(\frac{1}{1+\eta}\right)^d} \quad 16$$

which we can update by one period to yield:

$$\frac{\partial V(k_{t+d+1})}{\partial k_{t+d+1}} = \frac{\mu(1-\delta)}{-k_{t+d+2}(1+\eta)+k_{t+d+1}(1-\delta)+Ak_{t+1}^{\xi}\left(\frac{1}{1+\eta}\right)^d} + \frac{1+\eta}{-k_{t+d+1}(1+\eta)+k_{t+d}(1-\delta)+Ak_t^{\xi}\left(\frac{1}{1+\eta}\right)^d} \quad 17$$

Differentiating the Bellman equation with respect to k_{t+d+1} yields:

$$\frac{\partial V(k_{t+d+1})}{\partial k_{t+d+1}} = \frac{1}{\beta}\cdot\frac{\mu(1+\eta)}{-k_{t+d+1}(1+\eta)+k_{t+d}(1-\delta)+Ak_t^{\xi}\left(\frac{1}{1+\eta}\right)^d} \quad 18$$

Setting (17) equal to (18), and solving for the latest level of k, k_{t+d+2}, we have:

$$k_{t+d+2} = \frac{1}{1+\eta}\left[\frac{k_{t+d+1}(1+\eta)-k_{t+d}(1-\delta)-Ak_t^{\xi}\left(\frac{1}{1+\eta}\right)^d}{(\mu-\beta)(1+\eta)}\beta\mu(1-\delta) + Ak_{t+1}^{\xi}\left(\frac{1}{1+\eta}\right)^d + k_{t+d+1}(1-\delta)\right] \quad 19$$

Clearly, the dynamics of this difference equation are not so clear. However, at equilibrium, $k_t = k^*$ for all t. Imposing this condition and solving for k implies that:

$$k^* = \left(\frac{(1+\eta)^d(\eta+\delta)}{A}\right)^{\frac{1}{\xi-1}} \quad 20$$

One of the purposes of this paper was to determine how TTB determines the steady state. Thus, we differentiate the above equation with respect to d and note that it is negative:

$$\frac{\partial k^*}{\partial d} = \frac{(1+\eta)^d(\eta+\delta)^{\frac{1}{\xi-1}}}{A}\frac{\ln(1+\eta)}{\xi-1} < 0 \quad 21$$

where the inequality follows from the fact that $\xi < 1$. Thus, we see that increases in the time-to-build gestation lag (i.e. increases in d) cause a decrease in the steady state level of capital, and by implication of consumption and utility.

The second purpose was to show how habit formation determines the steady state. The degree of consumer's preferences for high levels of current consumption over high rates of change in consumption was captured by the μ parameter in the utility function; the steady state of capital *does not* depend upon μ. However, the time-path, as shown in the difference equation (19), *does* depend upon μ. Thus, there is an important difference between the time-to-build and habit formation.

It is interesting to note that the discount factor β does not determine the steady state level of k. This is strictly because consumption enters the period-utility function twice per period, once as current consumption and once as the reference-level of consumption. Thus, consumption also shows up twice in the value function (15): once in the maximization step in the interior of the value-function, and once in the inside of the V(.) term on the right-hand side of the value function. After maximization, the β's cancel. Thus, we have the somewhat paradoxical result that, when agents care about their consumption relative to the previous time period (habit-formation), time-preference loses its long-run effect.

As we noted, though, the transition dynamics to the steady state are not so clear. To solve for this, we resort to simulation in the section below.

NUMERICAL ANALYSIS OF TRANSITION PATHS

Given the solution of the steady state levels of k^*, the question remains: how do the time lags in production and in utility affect the transitional dynamics? To answer this question, however, we must resort to numerical solutions of the transition path (equation 19); thus, we require some numbers. We use a discount factor $\beta = 0.97$. This is because $\beta = 1/(1+r)$ where r is the risk-free rate of interest, and the average annualized yield on 1-month US Treasury Bills from Jan. 1, 1995 to the present (Jan. 14, 2011) is 3.2%. Capital's share of income, ξ, is 0.333. The worldwide population growth rate for 2009 was 1.133%, and the overall U.S. growth rate for 2010 is 0.97% (CIA World Factbook). Thus we use $\eta = 0.01 = 1\%$. We use δ=0.96 and A=1 for computational convenience. Our primary aim is to show the general features of this class of model, rather than calibrating it specifically to the features of the US, or any other, economy.

As a note, usually a set of arbitrary initial k_0's is provided, and then the time-path of subsequent k_t's is plotted. Here, the difference equation has more than one step, so initial conditions for k require more than one k_0. Rather, if $d=3$, then the first four

initial levels of k must be specified (k_0, k_1, k_2, k_3). If $d = 25$ then we need to provide the first (arbitrary) twenty-five initial values of k.

In Figure 1, we show the time-path of capital (per person) while varying d, the delay in production which embodies TTB. What is immediately apparent is the oscillatory behavior predicted by the previous researchers: Kalecki (1935), Asea and Zak (1997), Zak (1999), Szydłowski and Krawiec (2004), Kaddar and Alaoui (2008), and Bambi (2008). In general, the higher the investment lag d, the more cyclical is k_t, and hence y_t, output per person.

As we mentioned earlier, we must specify a sequence of initial starting values for k. In the picture below, we show 26 different lines, each one representing a different level of d from 0 to 25. Each of these lines requires a different number of initial values. Thus, for $d = 0$, we must provide one starting value; for $d = 25$, we must provide 26 starting values. This means that, in the picture below, each line starts from a different starting value (one more k than the previous one), *and* has a different d. To put it differently, in the Figures below, each equilibrium difference begins at period 26, but draws on initial values starting further and further back (as d increases).

We set μ=1 and let the investment lag d vary, so that we focus attention on the effects of TTB. We generated our initial values according to quartic growth. The larger is d, the more oscillations we see in the path of k_t. Below, we show the paths of k_t for $d = 0$ to $d = 25$.

The non-linear difference equation that describes the evolution of k implies, here, that convergence is also non-linear. Since the steady state k^* depends upon d, the lines in Figure 1 do not converge to each other; rather they each converge to their own $k^*(d)$.

Figure 1 shows the paths of k_t for different d's. Lines corresponding to higher d's draw on information reaching farther back into the sequence of initial k_0's. There are 13 lines, each corresponding to a different d. Reading down, from the right hand side of Figure 1, the top line (black) corresponds to $d = 0$. The next line down corresponds to $d = 2$, and increases in increments of two.

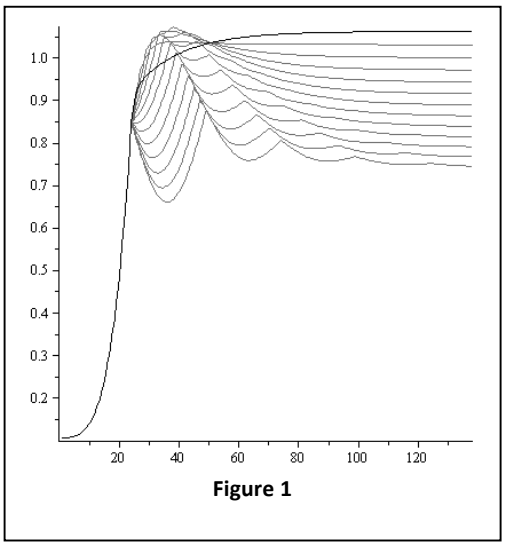

Figure 1

In Figure 2, below, we keep $d = 25$, so that the two curves have the same initial starting values. They differ only according to the degree of habit preference, μ. The top line (in blue) represents $\mu = 1.0$. The bottom (red) lines have μ increasing gradually to $\mu = 1.02$.

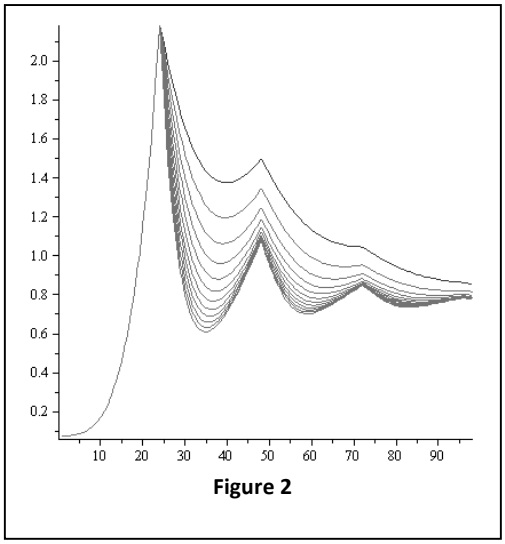

Figure 2

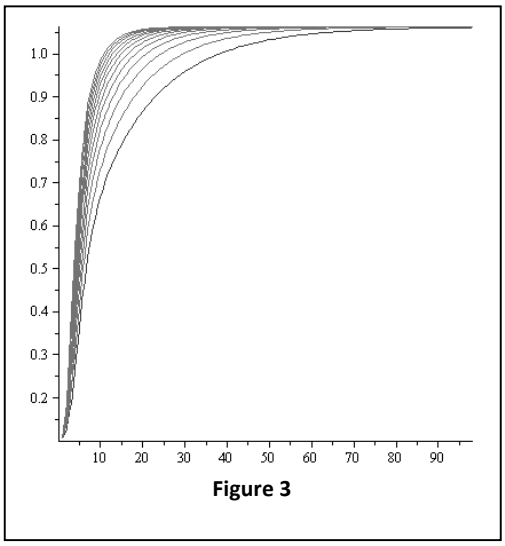

Figure 3

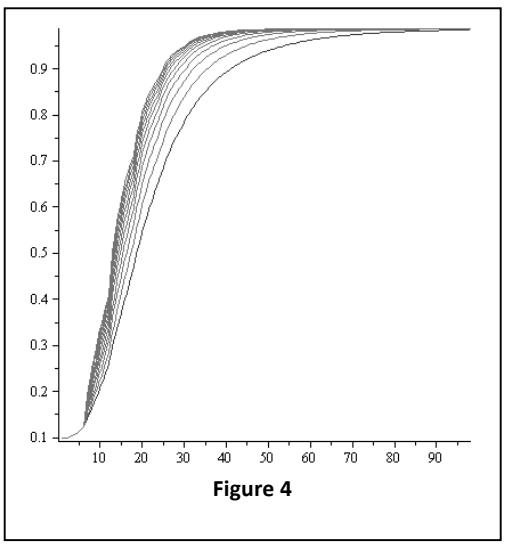

Figure 4

Figure 3: Varies μ from 1 to 1.02, with $d = 0$, and initial values below k^*. The bottom line corresponds to $\mu = 1$. It is quite paradoxical that when $\mu = 1$, consumers get the most utility from increases in consumption, and yet the economy grows slower.

Figure 4: Varies μ from 1 to 1.02, with $d = 5$, and with initial values below k^*. The bottom line corresponds to $\mu = 1$. We can see that habit-preferences delay the transition to k^*.

CONCLUSION:

We have computed an analytic equilibrium for a standard neoclassical growth model that has two modifications: habits in preferences, and time-to-build (TTB) technology. Both of these modifications involve lags, one in the utility function and the other in the production function. However, these innovations affect the economy in fundamentally different ways. A change in habits (μ) does not affect k^*, however it does affect the transition path toward k^*. The speed of convergence increases as μ increases. In other words, consumer preferences for higher levels income, rather than for higher rates of income growth, will not have any long-term effect on economic outcomes. But this preference for levels—over rates—of income, implies a higher rate of convergence toward the long-run level of income. Regarding TTB, when $d = 0$, we monotonically converge toward k^*. Things become more complicated as d increases. As d changes, k^* also changes, since it is a function of d. The transition path toward $k^*|d$ becomes more oscillatory as d increases. That is, increasing the time required for production not only affects how an economy evolves over time, but also affects the final trajectory.

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ENDNOTES

1. See Rabin (1998) for a more general discussion and literature review on adaptation/habituation theory. Frederick and Loewenstein (1999) provide evidence of a genetic basis for this phenomenon. A contrasting viewpoint can be had in Sacks, Stevenson and Wolfers (2010).

ESTIMATING THE FIRM DEMAND FOR MONEY USING DISAGGREGATED DATA

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It is common practice in studies of the firm demand for liquid assets to use data which collapses many firm-level observations into a single observation (the mean value) for each asset-size class in an industry. This aggregation hides distributional impacts if there are substantial economies of scale to liquid asset holding or if such things as cash management practices and access to financial markets are sensitive to a firm's scale of operation. Previous empirical studies, relying on industry average data, may have produced inaccurate estimates of scale and interest rate elasticities. Hunter (1978) and Katsimbris and Miller (1980, 1982a, 1982b) have warned that the size distribution of firms within an industry will affect the industry's demand for financial assets.

Empirical studies also assume that the asset-size categories chosen by government agencies are appropriate for the aggregation (i.e. that firms within each category are homogeneous and those across categories are heterogeneous). Vogel and Maddala (1967) found liquid asset demand functions to be heterogeneous across asset-size classes in cross-section data. However, they were unable to test whether these demand functions were heterogeneous within asset-size classes because they lacked firm-level data.

This study will evaluate whether firm-level data produces different estimates of scale elasticities than when aggregated data is used. The impact of ownership on firm holdings of liquid assets and the temporal stability of demand will also be examined. The complementarity hypothesis is used to explain differences in multinational and Brazilian firm behavior regarding economies of scale in liquid asset holding and some implications for development policy in Brazil is addressed.

THE APPROACH

In one of the earliest pieces on firm liquid asset demand Meltzer (1963) recognizes the presence of distribution effects. Researchers following Meltzer have generally ignored the aggregation issue assuming that firms regardless of size face the same risks, the same interest rates and the same cash flows. Vogel and Maddala (1967) captured the distribution effects by employing dummy variables for asset-size classes in their money demand regression equations. They concluded from cross-section data that asset-size classes are heterogeneous and that the sales elasticities were drastically reduced in both magnitude and significance with the introduction of the asset-size dummy variables. A separate analysis using pooled cross-section and time-series data showed that the magnitude of the asset-size dummy variable coefficients increased with greater asset size. This may be an explanation for the standard empirical result of a unitary sales elasticity (i.e. no economies of scale) when asset-size classes are not controlled for.

Katsimbris and Miller (1980) argued that conclusions regarding economies of scale in firm liquid asset holding may be incorrect when aggregated data are used without controlling for the distribution of firm size. Others suggest that the distribution of income as well as its level influences liquid asset demand at various levels of aggregation (Hunter 1978, Katsimbris and Miller 1980, 1982a, 1982b, Chan and Chen 1992, Landon 1992).

Studies of aggregated data are inconclusive about economies of scale. Studies using the IRS or SEC data without controlling for the size distribution of firms conclude that economies of scale do not exist (Meltzer 1963, Shapiro 1969, and Whalen 1965). Some studies that control for firm distribution also reach the same conclusion (Hunter 1978, Katsimbris and Miller 1980). However, Katsimbris and Miller (1982b) and the study that most directly controls for asset-size class (Vogel and Maddala 1967) conclude that economies of scale do exist.

Researchers using firm-level data also reach mixed conclusions about economies of scale. These studies have found unitary scale elasticities in Israel (Katz, Rosenberg and Zilberfarb 1985, Ungar and Zilberfarb 1980) and the United Kingdom (DeAlessi 1966) while economies of scale exist in Brazil (Falls and Natke 1988), Canada (Outreville 1988), Europe (Firreira and Vilela 2004) and the U.S. (Mulligan 1997).

Two related issues are the influences of industry affiliation and ownership on the firm demand for liquid assets. It has been common practice to control for industry either through a series of dummy variables or by running separate regressions by industry. Foreign ownership could reduce a firm's holdings of liquid assets because multinational subsidiaries may have superior cash management policies, greater access to foreign financial markets or can obtain funds through intra-firm lending.[1]

THE DATA AND ESTIMATING EQUATION

The data consists of annual observations of 211 Brazilian manufacturing firms during the period 1972-76. These firms are in nine two-digit industries as classified by the Brazilian Geographic and Statistical Institute.[2] The sample includes large as well as small manufacturing firms. Fifty-nine percent are multinational subsidiaries and the remaining firms (41 percent

of the sample) are privately-owned by Brazilians. All monetary variables are from the firms' balance sheets and income statements filed with the Ministry of Finance and are measured in real Brazilian cruzeiros with 1977 as the base year.[3]

A simple money demand model for firms is chosen since there are many alternative specifications in the empirical literature and the focus of this research is not model specification but aggregation. The transactions demand model takes the general form[4]:

$$\mathbf{lnLA = a + b_i\, IND_i + c_t\, YEAR_t + d\, OWN + e\, lnSALES + f} \quad (1)$$

where lnLA is the natural logarithm of liquid assets; IND_i is a dummy variable for each of eight industries (i = 12, 13, 14, 17, 20, 21, 24, 26 for the industries described in footnote 2); $YEAR_t$ is a dummy variable for each of four years (t = 3, 4, 5, 6 corresponding to years 1973, 1974, 1975 and 1976); OWN is a dummy variable for foreign-owned firms (equals zero for domestic firms); lnSALES is the natural logarithm of gross operating revenue; and f is the random error term. Inclusion of the intercept term means that the default category is interpreted as a Brazilian-owned firm operating in the metals manufacturing industry (IND_{11}) during the year 1972.

The liquid assets variable corresponds to a standard accounting definition and is approximately the sum of cash, bank deposits and short-term securities. Foreign ownership is measured by a dummy variable, OWN, which takes the value of one if the firm's foreign ownership is twenty-five percent or more and zero otherwise. For the aggregated data samples OWN equals one if the mean value of OWN for the industry asset-size class is greater than 0.25.[5]

Firm-level observations are also aggregated into eight asset-size categories within each industry according to the Securities and Exchange Commission's categories for the United States. See Appendix A for a description of these asset-size classes. The mean values of the variables for each asset-size class in an industry become a single observation. The size of the sample is reduced from 1055 observations (i.e. firms) in the five-year period to 254 observations (i.e. "typical firms") in the five-year period.

A second aggregation scheme divides each of the eight SEC asset-size classes into two classes at the mid-point. This 16-class aggregation scheme provides an intermediate step between the firm-level data and the eight-class aggregation scheme used by the SEC. This sample is composed of 412 "typical firms" for the five-year period.

Appendix B presents the number of firm observations and percentage distribution for each industry in the three data samples. There is some shifting in the relative number of observations per industry as aggregation increases. For example, the metals and electrical equipment industries experience a more rapid decline in observations relative to other industries (relative weights decreasing from 22 percent to 12 percent and 23 percent to 13 percent respectively).

EMPIRICAL RESULTS

Since it is common for the demand for liquid assets to be unstable over time an analysis of covariance was performed to examine the overall homogeneity of equation 1 over the period and thus the possibility of pooling the data. The outcome of these tests (not reported here but available from the author) suggest that allowing the intercept of the demand function to change over time provided temporal stability. Therefore, Table 1 employs a set of dummy variables for the years 1973-76 and uses data pooled over time.

The ownership dummy variable in Table 1 is insignificant across the three data sets. This suggests that ownership does not affect a firm's liquid asset holdings. This conclusion overlooks the possibility that multinational subsidiaries and Brazilian firms behave differently with respect to the scale (slope) variable. This possibility is explored later in Table 2.

Firms held fewer liquid assets in 1974 and 1976, other things equal, than the other years in the study. The economic upheaval caused by changes in the world oil market in 1974 had a large impact on Brazil which is a heavy importer of petroleum products. The YEAR6 dummy variable is not significant for the firm-level data set but reaches significance (at the 6 percent and 7 percent level) in the aggregated data sets. The liquid asset demand equation clearly shifts over time.

The coefficient of the scale variable (lnSALES) in the liquid asset demand function is higher when using the aggregated data sets than the firm-level data (1.013 and 1.014 versus 0.904). T-tests conclude that economies of scale exist for the firm-level data and the scale elasticity is unity for the 16-class and 8-class samples (see Table 3). The act of aggregation apparently does overstate the sensitivity of firm liquid asset holdings to changes in transactions (i.e. under state the economies of scale) found in the equation estimated with firm-level data. But further aggregation of firm-level data does not substantially alter the estimates of the scale elasticity.

The adjusted coefficient of determination rises as the data sets become more aggregated. This result is expected as the use of "typical firms" (i.e. the mean values of firm-level observations) reduces substantial variations in behavior across firms.

Table 2 examines if ownership influences firm responses to changing economic conditions by allowing both the intercept and the slope parameters to vary. For Brazilian firms, the YEAR4 dummy variable is significant (negative) for the firm-level data sample but insignificant for the aggregated data samples. All other year dummy variables are insignificant indicating that only in 1974 did Brazilian firms behave differently by holding fewer liquid assets than in the default year of 1972. When the same equations are estimated for the multinational firms a different pattern emerges. The YEAR4 dummy variable is significant (negative) for all data samples. In addition, YEAR6 is significant (negative) for the 16-class and 8-class samples. The results suggest that the liquid asset holdings of Brazilian firms were less responsive than multinational subsidiaries to

changing economic conditions, assuming that the year dummy variables can adequately measure these changes.

While the coefficients of the scale variable (lnSALES) are always highly significant in the equations of Table 2 it is clear that ownership affects a firm's liquid asset management. Brazilian firms have greater sales elasticities than multinational firms (i.e. multinationals hold lower liquid asset balances for a given level of transactions). For the firm-level sample multinationals experience economies of scale in liquid asset holding (elasticity of 0.860) while Brazilian firms have a unitary elasticity (see the t-tests presented in Table 3). For the aggregated data samples, this difference in behavior across ownership groups is not statistically significant (i.e. all firms have unitary elasticities, see Table 3). The use of aggregated data, therefore, disguises the existence of economies of scale found with the firm-level data.

As with Table 1 the summary statistics of Table 2 are influenced by the level of data aggregation. There is a progressive increase in adjusted R^2 as the level of aggregation increases for both the Brazilian and multinational firm samples.

Overall, the results of Table 2 argue that Brazilian firms and multinational subsidiaries behave differently with regard to liquid asset management and their sensitivity to changes in a firm's scale of operation.

COMPLEMENTARITY

In fully industrialized economies with relatively abundant capital and well-organized financial markets, capital and real financial balances held by firms are substitutes for one another. Money and capital are treated as competing forms of wealth in portfolio management: money is held for its usefulness as a medium of exchange; capital is held because its own rate of return is greater than that on money. When relative rates of return change, firms will switch balances between financial and physical capital.

In less developed countries (LDCs) physical capital is scarce and financial markets may be segmented and inefficient. Most firms are small, have little or no access to financial markets and are confined to self-financed investment (Nadi 1989 and Tybout 1983). Since most investment is indivisible, firms must save for capital formation by holding money balances. An increase in the rate of return to physical capital encourages firms to hold higher real money balances to acquire more capital. Therefore, financial assets and physical capital have a complementary relationship (McKinnon 1973). Laumas (1980) has argued that self-finance of investment may be important in the corporate sector of developing nations as well as among small family-owned firms.

As Fry (1995) has described, McKinnon's complementarity hypothesis has been tested several times using macroeconomic data but these provide little support for self-financing by firms. A few empirical studies using industrial or firm-level data have found some support for a complementary relationship between capital and liquid asset balances in India (Laumas and Williams,1983), Korea (Mohabbat and Yuhn, 1991), and Brazil (Natke 1999) .

A COMPLEMENTARITY EXPLANATION OF RESULTS

Brazilian financial markets were segmented during the period with domestic Brazilian firms bearing the brunt of credit rationing by private banks while multinational firms were the preferred borrowers and could seek funding in international markets. Domestic firms had to more heavily rely on self-financing of investment by building liquid asset balances prior to purchasing physical capital. There is some evidence of this complementarity hypothesis for Brazil during the period (Natke 1999) and could be the reason that Brazilian firms had a higher sales elasticity than multinational firms in the current study.

If sales and investment are correlated the sales elasticity could be measuring two effects for Brazilian firms: the sales elasticity associated with the transactions motive and the self-finance motive associated with investment. Presumably, the self-finance motive does not exist for multinational firms so the sales elasticities reported for these firms correspond to the transactions motive alone. Thus, the differences in reported sales elasticities may merely reflect the complementarity of liquid assets and physical capital for Brazilian firms.

To explore this possible explanation, the sales and investment elasticities estimated by Natke (1999) will be compared to the estimates reported here. In Table 2, the differences in estimated sales elasticities between Brazilian and multinational firms are 0.116, 0.084 and 0.069 for the firm-level, 16-class and 8-class data sets respectively. In Table 4, the investment elasticities for Brazilian firms as estimated by Natke (1999) were 0.090 when investment in the next period ($invest_{t+1}$) is used to measure planned investment and 0.112 when contemporaneous investment spending ($invest_t$) is used. These investment elasticities closely correspond to the differences in sales elasticities between multinational and Brazilian firms reported above. These results suggest that multinational and Brazilian firms have similar economies of scale on transactions balances but Brazilian firms hold additional liquid assets to help finance their capital expansion plans.

A government development policy which reduces financial repression and raises real interest rates could increase the flow of funds to the financial system, improve its efficiency in distributing funds to their most highly valued uses and thereby promote capital accumulation and economic growth. If a substantial amount of cash balances is being held for self-finance purposes, then improvements in the financial system will promote economic growth by releasing these funds to the financial system.

SUMMARY AND CONCLUSIONS

This paper has examined how the aggregation of firm-level data into asset-size classes influences the measurement of economies of scale in liquid asset management. Data aggregation increases the estimated scale elasticity and erroneously concludes that

economies of scale do not exist. Economies of scale are only found in demand equations that were estimated using firm-level data that included multinational firms in the sample (i.e. either all firms or only multinationals). Brazilian firms exhibit unitary scale elasticity across all data samples.

The differing scale economies across ownership groups are attributed to the need of Brazilian firms to self-finance investment spending. When the self-finance motive is accounted for, Brazilian firms exhibit economies of scale in transactions balances similar to multinational firms. This suggests that improvements in the financial system could speed economic development by releasing more cash balances for productive investment opportunities and improve the power and speed of monetary policy.

Ownership is found to alter the slope of the liquid asset demand function (i.e. lnSALES) but not the intercept. Regression results indicate that economic conditions in 1974 and 1976 caused firm behavior to differ from that in the other years of the period. Again there was a difference in firm behavior across ownership groups: multinationals were more sensitive to changes in economic conditions. Thus appropriate modeling of the demand equation dictates controls for industry affiliation, year and ownership.

Table 1

Estimates of equation one across the three data sets*

	Firm sample	16-class sample	8-class sample
constant	-2.061	-3.256	-3.230
	(-6.47)	(-8.13)	(-9.06)
OWN	0.004	0.076	0.038
	(0.06)	(0.78)	(0.40)
YEAR3	-0.066	-0.085	-0.111
	(-0.76)	(-0.73)	(-1.04)
YEAR4	-0.249	-0.331	-0.282
	(-2.88)	(-2.86)	(-2.72)
YEAR5	0.006	-0.108	-0.063
	(0.75)	(-0.93)	(-0.60)
YEAR6	-0.087	-0.214	-0.199
	(-0.99)	(-1.82)	(-1.92)
lnSALES	0.904	1.014	1.013
	(36.23)	(33.64)	(38.79)
adjusted R^2	0.60	0.76	0.87
F	115	95	124
n	1055	412	254

* T-statistics in parentheses. The estimated equations include a full set of dummy variables for industry. These coefficients are not reported here but are available from the author.

Table 2

Estimates of equation one by ownership group across the three data sets*

	Firm sample		16-class sample		8-class sample	
	Brazilian	MNC	Brazilian	MNC	Brazilian	MNC
constant	-2.858	-1.667	-4.258	-2.990	-4.294	-3.230
	(-5.88)	(-3.81)	(-4.09)	(-6.56)	(3.18)	(-8.89)
YEAR3	-0.015	-0.101	0.024	-0.098	-0.281	-0.062
	(-0.13)	(-0.85)	(0.09)	(-0.77)	(-0.86)	(-0.59)
YEAR4	-0.263	-0.243	-0.075	-0.375	-0.044	-0.331
	(-2.23)	(-2.02)	(-0.28)	(-2.96)	(-0.14)	(-3.21)
YEAR5	-0.018	0.019	0.303	-0.208	-0.042	-0.065
	(-0.15)	(0.16)	(1.09)	(-1.66)	(-0.13)	(-0.64)
YEAR6	-0.034	-0.126	0.403	-0.381	0.631	-0.301
	(-0.28)	(-1.04)	(1.39)	(-3.02)	(1.91)	(-2.96)
lnSALES	0.976	0.860	1.079	0.995	1.083	1.014
	(25.63)	(25.84)	(14.28)	(29.71)	(11.71)	(38.28)
adjusted R^2	0.66	0.57	0.77	0.75	0.85	0.89
F	66	63	25	75	22	124
n	430	625	96	316	46	208

* T-statistics in parentheses. The estimated equations include a full set of dummy variables for industry. These coefficients are not reported here but are available from the author.

Table 3

T-tests for economies of scale in liquid asset holding*

Model specification	Firm-level sample	16-class sample	8-class sample
Table 1	-3.85***	0.46	0.50
Table 2			
Brazilian	-0.65	1.05	0.90
MNC	-4.29***	-0.15	0.53

* The null hypothesis is that the coefficient for lnSALES is equal to one. Significant and negative t-values indicate economies of scale. Insignificant t-values represent unitary sales elasticities. See respective Tables for exact model specifications.

*** significance at the 99% level

Table 4

Estimated sales and investment elasticities for Brazilian firms

sample	sales elasticity	investment elasticity
		$invest_{t+1}$
all firms	0.894**	0.090**
large	0.640**	-0.012
small	0.635**	0.191*
		$invest_t$
all firms	0.578**	0.112**
large	0.520**	0.066
small	0.342*	0.217*

* significant at the10 percent level
**significant at the 5 percent level

ENDNOTES

* Any errors that remain are attributable to the author's strong fondness for his own ideas.

1. The following have concluded that behavioral differences based on ownership did exist in Brazil during the time period under study: Connor and Mueller (1982), Newfarmer (1985), and Newfarmer and Marsh (1981).

2. The industry classifications are: ferrous and non-ferrous metals and products (IND_{11}); capital equipment (IND_{12}); electrical equipment (IND_{13}); Automotive and transportation (IND_{14}); paper products (IND_{17}); petroleum and basic chemicals (IND_{20}); pharmaceuticals (IND_{21}); fibers and fabrics (IND_{24}); and food products (IND_{26}).

3. The data are subject to the usual limitations encountered in accounting data: the measures are aggregated over the course of one fiscal year and this may be too long to pick up significant variations, the fiscal year-end figures may not be representative due to various "window dressing" techniques, and firms end their fiscal years at different points during the calendar year.

4. A measure of the interest rate is not included in the model. There are several reasons for this: 1) the interest rate measure would not vary across firms but only across years since data was unavailable on the interest rates paid or earned by each firm. Variations in economic and financial market conditions across year have already been captured by the year dummy variables; 2) a change in the interest rate may not cause a change in liquid asset holdings but could change the composition of liquid asset holdings (e.g. a switch between cash and short-term securities); 3) some firms, particularly small ones, may have restricted access to formal financial markets. They often cannot borrow at any interest rate and often only earn low or negative real interest rates on deposit accounts. Therefore, a market interest rate does not accurately measure the opportunity cost of internally holding funds or the true cost (including search and transactions costs) of borrowing; 4) trial regressions, not reported here, indicate that the Brazilian Treasury bill rate (the mean of reported monthly figures) does not belong in the liquid asset demand equation: coefficients for the T-bill rate are insignificant and a model specification test (Chow) concludes that the T-bill rate does not belong in the demand equation.

5. The twenty-five percent rule is common in empirical work because it is sufficient ownership control to strongly influence or control the appointment of management and the direction of management decisions.

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APPENDIX A

Securities and Exchange Commission's asset-size classifications*

SEC asset-size classifications	Brazilian cruzeiro classifications
under $5 million	under 29.67 million cruzeiros
$5 - 10 million	29.67 - 59.34 million cruzeiros
$10 - 25 million	59.34 - 148.35 million cruzeiros
$25 - 50 million	148.35 - 296.70 million cruzeiros
$50 - 100 million	296.70 - 593.40 million cruzeiros
$100 - 250 million	593.40 - 1483.5 million cruzeiros
$250 - 1000 million	1483.5 - 5934 million cruzeiros
$1000 million and over	5934 million cruzeiros and over

* These are nominal monetary units converted to cruzeiros by the 1972 cruzeiro/U.S. dollar exchange rate (5.934) as reported in International Financial Statistics series rf. Series rf represents period averages of market exchange rates.

APPENDIX B

Observations by industry for the three samples*

Industry	Firm sample	16-class sample	8-class sample
metals	230 (22%)	52 (13%)	30 (12%)
capital	100 (10%)	46 (11%)	26 (10%)
electrical	240 (23%)	57 (14%)	33 (13%)
transportation	95 (9%)	48 (12%)	33 (13%)
paper	65 (6%)	40 (10%)	26 (10%)
petro-chemical	95 (9%)	44 (11%)	25 (10%)
pharmaceuticals	95 (9%)	45 (11%)	29 (11%)
fibers and fabrics	75 (7%)	37 (9%)	23 (9%)
food	60 (6%)	43 (10%)	29 (11%)

* Columns may not sum to 100% due to rounding.

SYSTEMATIC RISK IN SELF-INSURANCE GROUPS FOR WORKERS' COMPENSATION LOSSES

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I. INTRODUCTION

As Ligon and Thistle (2005) note, mutual organizations (mutuals) may address problems of adverse selection, and their size is limited by *asymmetric information* problems. Therefore, small mutuals are supposed to offer their members advantages that will mitigate the organizations' weakness in risk sharing. Mayers and Smith (2000, p. 693) have concluded that the major benefit the mutual organization provides is the internalization of potential conflicts between owners and customers over dividend, financing, and investment policies. Furthermore, Lee and Ligon (2001) suggest that relatively small risk-sharing arrangements are viable institutions because they can alleviate the problems caused by moral hazard. Due to the liability crisis of the mid-1980s, there has been rapid growth in alternative risk financing mechanisms such as group self-insurance for workers' compensation (WC) loss exposure. To date, however, no studies have provided empirical evidence about the financial benefit of group self-insurance for WC losses—even though the number of states where group self-insurance is allowed surged to thirty-nine in 2006, up from twenty-three in 1982.[1]

A self-insurance group for WC liability is arranged like a mutual organization (i.e., a member-owned entity), in which the interests of owners and consumers are merged.[2] That is, a number of employers with common interests enter into an agreement to pool their WC liabilities. Risk retention in the form group self-insurance is viewed as an *alternative risk transfer* technique—meaning an alternative to conventional insurance.[3] Group self-insurance works as a risk pooling arrangement to retain WC risk. Ligon and Thistle (2005) demonstrate that small mutuals are unlikely to offer a risk-sharing advantage over conventional insurance. Unlike investor-owned stock insurers, which can diversify unsystematic risk across the entire capital market, policyholder-owned mutuals can spread this risk only across their membership—and they thus assume a considerable amount of WC risk.[4] Accordingly, self-insurance groups must provide some advantages to their participating employers. Otherwise, employers would just use conventional insurance in lieu of the alternative risk financing mechanism.

This paper investigates whether self-insurance groups afford their members the benefit of rate stability. Stable premium payments may be a powerful motivation for employers to establish a self-insurance group. First, the property-liability insurance market is characterized by underwriting cycles (Lamm-Tennant and Weiss, 1997; Grøn, 1994; Winter, 1994; Cummins et al., 1992; among others). It is difficult for certain employers to obtain liability insurance in the hard market. In addition, Holzheu et al. (2003) indicate a conflict in the commercial insurance market. Buyers of commercial insurance might reasonably expect predictable, stable premium payments in exchange for submitting to a variety of risks and uncertainty. However, their expectation is undermined because the underwriting cycles result in insurance price volatility. Fluctuating WC premiums in the commercial WC market have creating a growing demand for a risk transfer alternative (e.g., group self-insurance) for WC loss exposure. Second, WC liability insurance contracts are essentially long-tailed, and their claims often take years to settle. The insurers who underwrite policies may have difficulty predicting the ultimate cost of liability insurance—and thereby fail to price WC products appropriately. In conjunction with unaffordable and/or unavailable coverage in the hard market, an upward spiral of WC costs may lead certain employers to consider using non-traditional methods to tackle their WC risk.

This empirical analysis of the advantage of stable premium payments uses financial data on group self-insurance associations (GSIAs) provided by the Virginia (VA) Bureau of Insurance. The data include the annual financial statements of all VA self-insurance groups since their inception. In light of variation in the WC regulations of different states, this data-set on self-insurance groups located in the same regulatory environment allows an objective measurement of the benefit of rate stability. The least-squared regression model is used to investigate how sensitive each group is to the market by examining the beta coefficient. The systematic and unsystematic risk portions are computed to determine the prime cause of price volatility in self-insurance groups.

The results of this investigation suggest that self-insurance groups in VA failed to offer stabilized WC rates to their members. Each group experienced higher price volatility than the market did for the corresponding period, due to a higher dispersion (measured by the standard deviation of price changes). However, thirteen out of fifteen groups had a less-than-one beta value. This implies that these groups were less responsive to market movement. The driving force behind price volatility is unsystematic risk confronting a self-insurance group. In addition, one third of all groups in VA are affiliated with the construction industry—a sector characterized by high occupational incidence rates, according to Chang and Weiss (2011).[5] These construction-sector employers mitigate their exposure to systematic risk by arranging self-insurance groups for their WC coverage. The most plausible explanation is the real-world phenomenon that insurance carriers are more likely to reject high-risk employers or charge them abnormally high premiums, a situation that may encourage them to give up

conventional insurance in favor of alternative risk-financing methods. In the aggregate, this paper highlights a new empirical finding: namely, that group self-insurance may provide members with the advantage of lower levels of systematic risk.

This paper improves on previous research in three ways. First, it is an empirical study that offers a new window into mutual mechanisms that take the form of group self-insurance for WC liability. The unprecedented data-set from the WC market in VA puts this work at the forefront of efforts to empirically examine the influence of systematic risk on self-insurance groups for WC loss exposure. Self-insurance groups can internalize conflicts between the insurer and the insured, reducing the effect of systematic risk. Second, given that self-insurance for WC risk is the most prevalent part of the alternative risk transfer market, the results of this study will complement the literature that has investigated why certain small- or medium-sized employers, which cannot self-insure individually, pool their resources to retain their WC losses.[6] Third, this study's findings offer a valuable reference to policymakers who are still hesitant about whether to approve group self-insurance for WC liability. The limited availability and increased costs of liability insurance coverage were the seeds of dramatic deregulation in the WC market, especially in the mid-1980s and early 1990s.[7] Insulation from systematic risk may justify a firm's decision to use group self-insurance for WC losses. This advantage is also valuable to risk managers who are discontented with the traditional insurance market and interested in alternative risk transfer opportunities through group self-insurance.

Section **II** reviews the regulatory environment under which VA self-insurance groups operate. Section **III** briefly describes the study's theoretical background and develops testable hypotheses regarding stable premium payments in the self-insurance groups. Section **IV** offers details about the study's methodology, data, and results. A conclusion and discussion of future research are presented in Section **V**.

II. WORKERS' COMPENSATION AND GROUP SELF-INSURANCE IN VIRGINIA

Workers' compensation is a social insurance program designed to compensate workers who have been disabled by job-related injuries and diseases.[8] WC programs vary considerably from one jurisdiction to another because the federal government has no direct role in state WC regulation.[9] However, WC laws in different states share a similar underlying objective: to provide a no-fault remedy for workers who are injured in the course of their employment. WC is usually financed by employers, who can buy insurance coverage from private carriers or state funds. Alternatively, they can self-insure on an individual or a group basis.[10] Virginia is ranked thirteenth in the U.S. in terms of total WC benefits paid in 2008.[11] The amount of WC benefits paid in VA is approximately equivalent to the amount paid in Minnesota or Wisconsin. In 2008, 26.9% of the WC benefits paid in VA were financed by individual and group self-insurers, compared with the national average of 25%.

The "liability crisis" of the mid-1980s caught the attention of both the federal and state governments. Policymakers strove to carry out reforms aimed at lowering the cost of liability coverage and inviting more competition to existing insurance providers—and these reforms often included the authorization of group self-insurance. In the meantime, many employers pushed their insurance brokers to help them find more cost-effective programs.[12] The fundamental objective of group self-insurance is to offer an alternative arrangement to the standard markets', an arrangement that would broaden the coverage options available to small- and medium-sized businesses.[13]

The Commonwealth of Virginia is one of the twenty-three U.S. states that have permitted group self-insurance for WC liability since the early 1980s.[14] A growing number of companies work together to self-insure for WC risk, assuming financial responsibility for the payment of WC benefits due to the injured employees of participating employers, rather than transferring that financial responsibility to insurance carriers. The net premiums written by self-insurance groups in VA almost doubled between 2000 and 2008, rising from $63 million to $119 million.

Group self-insurance is a risk retention tool, allowing participants to mitigate inefficiencies in the WC insurance market (e.g., the high transaction cost of dealing with the insurance industry related to adverse selection, moral hazard and other imperfections).[15] In order to be authorized as a GSIA by state authorities, the organization must be comprised of homogeneous members, demonstrate sufficient financial strength, provide adequate security, and purchase excess insurance for catastrophic losses. The members of the group enter into an agreement to pool their liabilities for WC benefits, and each agrees to *jointly and severally* assume any WC liability.[16] Safety-conscious, homogeneous employers band together in order to obtain more advantageous WC costs. All participants are held accountable for the results and share in any cost savings. The group, once it is formed, has a great deal of latitude in establishing its own underwriting policy, rating structure, and services.[17] The group assumes responsibility for all the services an insurer typically performs, such as claims management, actuarial services, legal counsel, loss control, and administration of the program. A group administrator serves as a delegate of the association's members, ensures compliance with the provisions of regulatory rules, executes the board's policies, and coordinates outside and/or in-house services—including (but not limited to) claims processing, loss control, and legal, accounting, and actuarial services.[18]

III. THEORETICAL BACKGROUND AND HYPOTHESES

Compared with the abundance of theoretic models indicating that mutual organizations exist to address adverse selection and moral hazard, few empirical studies to date have tested for the benefits of establishing a mutual entity in the WC insurance market.[19] Smith and Stutzer (1990a) extended the Rothschild-Stiglitz model, suggesting that mutual insurers are chosen by agents with low loss probability in the presence of adverse selection and aggregate uncertainty. Their argument is substantiated by the claim data of medical malpractice insurance from two insurers in Minnesota: one investor-owned

stock insurer and one policyholder-owned mutual insurer. Smith and Stutzer (1990b) go further, proposing an alternative theory of mutuality in which mutuals can work as a self-selection mechanism to handle adverse selection and systematic risk. Similarly, Hansmann (1996) contends that mutuals were created to solve the adverse selection problem, which is due in part to the inability of insurance companies to distinguish among prospective customers that represent different risks. Ligon and Thistle (2005, p. 531) present a model to explain the coexistence of both stock and mutual organizational forms, suggesting that coexistence is driven by heterogeneity, unobservable in their case, in the consuming population.[20] As a result, low-risk consumers prefer mutuals, whereas high-risk consumers tend to buy insurance from stock insurers (Ligon and Thistle, 2005; Smith and Stutzer, 1990a, 1995).[21]

The current debate in the extant literature also centers on whether high- or low-risk organizations are more likely to self-insure for their WC losses. On the one hand, Harrington and Danzon (2000; see also Danzon and Harrington, 2001) contend that low-risk firms drop out of the market and self-insure for WC liability, while high-risk firms are less likely to self-insure, as a consequence of cross-subsidization from low- to high-risk firms in the commercial market.[22] Similarly, Holzheu et al. (2003, p. 12) argue that employers with good risk may not be able to obtain traditional insurance coverage at rates reflecting their individual risk level—but only at the higher (average) market rates—as a result of asymmetric information between the insurer and the insured. These good risks are reluctant to subsidize bad risks, and may thus turn to self-insurance for cost efficiency. On the other hand, Kwon and Grace (1996, p. 262) point out that most high-risk employers are driven to self-insure because of commercial insurers' high surcharge. Baranoff (2000) has concluded that school districts in Texas with higher actual loss experience choose to self-insure for WC liability. As a matter of fact, risk retention in the form of self-insurance can be arranged on an individual or a group basis under different regulatory codes. Though they suggest that the health services sector is significantly linked to self-insurance, Chang and Weiss (2011) do not differentiate between individual and group self-insurance. The above inferences, in brief, do not empirically address the economic and/or financial advantage of setting up self-insurance groups for WC risk.

Stable premium rates may be instrumental in encouraging employers to establish a self-insurance group in the face of the volatile liability insurance market, which is characterized by underwriting cycles. According to Mayers and Smith (1988, p. 358), mutuals should have a comparative advantage in longer-term policies. WC is notorious for its long tail, an insurance expression denoting that some claims may take years to settle. The ultimate cost of settling a claim is very difficult to predict, and the actual cost of the settled claim will not be determined for several years. Due to asymmetric information, insurers may have difficulty pricing their insurance products for WC liability properly. In addition, Hansmann (1996) contends that mutuals were created to solve adverse selection problems, due in part to insurance companies' inability to distinguish among the risks carried by prospective heterogeneous customers. Fama and Jensen (1983b) argue that the future net cash flows of mutual insurers should be more certain, while Lamm-Tennant and Starks (1993) find that mutual insurers have less risk proxied by the variance of the loss ratio. Therefore, equipped with the participatory nature of mutual insurance policies, group self-insurance appears to provide an alternative way for employers to manage their long-tailed WC liability. Above all, Ligon and Thistle (2005) conclude that small mutuals must offer some advantages over conventional insurance. Group self-insurance associations may provide their participants with the benefit of more predictable premium payments, because conflicts between owners and customers are internalized and asymmetric information issues may be removed. Therefore, the first hypothesis is formulated as:

H_1: Self-insurance groups provide their members with the advantage of stabilized rates.

Alternative risk transfer products can partially insulate corporations from volatile insurance market cycles (Holzheu et al., 2003). By using group self-insurance as an alternative risk financing mechanism to finance their WC liability losses, participants may have the opportunity to manage a cost that has escalated out of control in the commercial liability market—especially in the hard market. Proposing an alternative theory of mutuality, Smith and Stutzer (1990b) contend that mutuals can function as a self-selection mechanism to handle systematic risk, thanks to the participatory nature of mutual insurance policies. As a result, a pool of employers who collectively adopt a group self-insurance program may distance itself from the unsteady WC commercial market. Consequently, the second hypothesis is proposed as:

H_2: The WC price volatility in self-insurance groups is not driven mainly by systematic risk.

IV. METHODOLOGY, DATA, AND RESULTS

The first part of this section specifies the regression model used in this study's analysis, defining the dependent and independent variables. The next part describes the data. Finally, the section ends by enumerating the empirical results and discussing various ways to interpret them.

Methodology

The empirical measurement of rate stability in self-insurance groups is approached by employing the least-squared regression model to find the slope of the regression line (beta coefficient). The model can be expressed as

$$r_i = a_i + \beta_i r_m + e_i,$$

where r_i is defined as the WC price percentage change (i.e., price growth) over a year for $group_i$, and r_m for the WC market in Virginia. β_i is the beta coefficient for $group_i$. a_i is the intercept, while e_i is a random error term.

As previous studies have done (Chang and Weiss, 2011; Kwon and Grace, 1996), this study measures WC price as the inverse of the loss ratio. This ratio is defined as net premiums earned divided by the sum of losses incurred and loss adjustment

expenses. It is interpreted as a price because it is a markup over losses. The percentage change is calculated by $(\text{Price}_t - \text{Price}_{t-1}) \div \text{Price}_{t-1}$.

The beta coefficient, a proxy of each group's systematic risk, can estimate the group's sensitivity to the market portfolio.[23] This value serves as an index of the degree of movement a group's price growth will experience in response to a change in the price growth of the market. Simply stated, the price growth of a group with a less-than-one beta value is anticipated to change by less than 1% for each 1% change in the price growth of the market portfolio. As Mayers and Smith (2000) note, the mutual structure can internalize conflicts between owners and customers. Self-insurance groups should be in a good position to tackle asymmetric information issues. Therefore, price changes in self-insurance groups should not be as volatile as the aggregate market is, so the beta coefficient should be less than one. In addition, the variance of price percentage changes is used as a proxy for the total risk experienced by a self-insurance group.[24] The systematic risk portion is computed to obtain the systematic risk share (i.e., the systematic risk portion as a percentage of total risk). This share is used to determine to what degree the price volatility in a self-insurance group is due to the impact of market movement. If a group can better handle market risk, its systematic risk share should be less than the unsystematic risk share.

Data

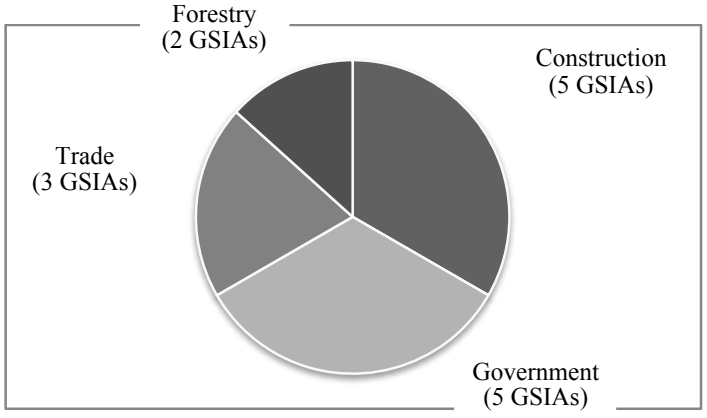
To conduct an empirical analysis of the advantage of rate stability, this study uses the financial data that GSIAs annually submitted to the Financial Regulation Division of the Commonwealth of Virginia's Bureau of Insurance. The data set includes all the annual financial statements of fifteen active self-insurance groups since their inception, providing a unique window into the self-insurance groups regulated in that one jurisdiction.[25] The data on WC underwriting experience for Virginia came from profitability reports published by the National Association of Insurance Commissioners.

Table 1 presents a list of these fifteen Virginia GSIAs, along with profile information on each group—such as its administrator, industry affiliation, and date licensed. Six of the fifteen GSIAs are administered by the same administrator, while the remaining nine are each served by a different administrator. Approximately two thirds of the groups have been in business since the early 1980s.

Table 1
Group Self-Insurance Associations (GSIAs) in Virginia

No.	GSIA	Administrator	Industry	Year Licensed	Sample Period
1	**Building Insurance Association Inc.**	Tidewater Builders Association	Construction	1999	1999–2006
2	Commonwealth Contractors	Self-Insured Concepts, Inc.	Construction	1981	1981–2007
3	Merchants of Virginia	Self Insurance Service, Inc.	Trade	1982	1988–2007
4	Prince William County	Self Insurance Service, Inc.	Government	1989	1989–2007
5	School System of Virginia	Self Insurance Service, Inc.	Government	1982	1982–2007
6	United Contractors of Virginia	Self Insurance Service, Inc.	Construction	1981	1982–2007
7	**Virginia Automobile Dealers Association**	Virginia Automobile Dealers Services, Inc.	Trade	1981	1981–2007
8	Virginia Association of Counties	VACo Risk Management Programs, Inc.	Government	2001	2001–2007
9	Virginia Commerce	**Landin, Inc.**	Trade	1982	1982–2007
10	Virginia Contractors	Thomas Rutherfoord, Inc.	Construction	1982	1983–2007
11	Virginia Forestry Safety	Self Insurance Service, Inc.	Forestry	1995	1995–2007
12	Virginia Municipal	VA Municipal League Insurance Programs	Government	1980	1980–2007
13	Virginia School Boards Association	Virginia School Boards Association	Government	1996	1997–2007
14	WCAMC Contractors	WC Accounts Management Corp	Construction	1985	1985–2007
15	Wood Products of Virginia	Self Insurance Service, Inc.	Forestry	1982	1991–2007

Figure 1
Group Self-Insurance Associations in Virginia by Industry



Note: The number inside the parentheses is the number of groups affiliated with that industry.

Intriguingly, five of these fifteen GSIAs are composed of employers in the construction industry. Figure 1 graphically demonstrates an industry affiliation breakdown for all the GSIAs in Virginia. According to Chang and Weiss (2011), the construction sector is characterized by very high nonfatal and fatal WC incidence rates. That is, employers in this high-risk sector confront a great deal of occupational WC risk. Theoretically speaking, high-risk organizations are more likely to buy insurance in the standard insurance market. In practice, they may choose to retain their WC loss exposure on a group basis instead because of the benefits provided by self-insurance groups.

Nevertheless, none of these mutual groups is affiliated with the low-risk industries, such as finance, insurance, real estate and business services, which are characterized by low WC incidence rates. Employers in the low-risk industries may not be interested in group self-insurance on the grounds that a fertile commercial marketplace offers attractively low rates for their WC liability coverage. They are less likely to find WC insurance either unaffordable or unavailable.

Empirical Results

The results start with the descriptive statistics in Table 2. This table lists WC price percentage changes in GSIAs and in the Virginia WC market. Next, the rate stability of self-insurance groups is analyzed. Then the beta values are interpreted to demonstrate GSIAs' sensitivity to the Virginia WC market. Finally, self-insurance groups are classified by industry and size in Table 3 to determine whether rate stability is linked to the business type and magnitude of the groups.

GSIA-participating employers do not acquire the advantage of rate stability which should theoretically accompany a risk pooling arrangement for WC losses. According to Table 2, the average and standard deviation of the price changes for each GSIA are higher than the same values for the Virginia WC market over the corresponding sample period. In other words, every GSIA has a measure of dispersion of price percentage changes higher than that of the aggregate WC market in Virginia. One feasible explanation is that self-insurance groups readjust their premium rates promptly to reflect any loss experience, and thereby encounter a relatively higher dispersion of price percentage changes. This result agrees with the analysis of Lee and Ligon (2001), who suggest that risk pooling arrangements experience an inferior risk-sharing capacity—but it is at odds with the first hypothesis, which states that the members of self-insurance groups will benefit from stabilized rates.

Next, this study analyzes the groups' sensitivity to the WC market in Virginia by examining beta coefficients.[26] In Table 3, of the fifteen self-insurance groups, the thirteen have a less-than-one beta coefficient. That is, these thirteen GSIAs experienced a less than 1% change in their WC price growth for each 1% change in the price growth of the WC market. This result is consistent with the second hypothesis, which states that the volatility of WC price changes in self-insurance groups is not driven mainly by systematic risk. It also lends support to Smith and Stutzer (1990b), who argue that a mutual can work as a self-selection mechanism to deal with systematic risk.

Systematic risk is not the principal source of the total risk facing self-insurance groups. Table 3 demonstrates that twelve out of fifteen groups (80%) have a systematic risk share of less than 10%. The systematic risk share is the systematic risk portion calculated as a percentage of total risk, which is proxied by the variance of the price percentage changes within a group. The twelve groups' small systematic risk share implies that the price volatility within these groups is not primarily due to market movement. This outcome agrees with Holzheu et al. (2003), who assert that alternative risk financing techniques may shield employers from the fluctuating commercial market. Given the choice between conventional insurance and group self-insurance, certain employers select the latter for their WC loss exposure because it helps member corporations partially avoid insurance cycles. This finding is also consistent with the second hypothesis, which states that the volatility of price changes in self-insurance groups is not driven primarily by market fluctuations.

On the other hand, self-insurance groups are more exposed to unsystematic risk attributable to firm-specific factors stemming from particular group members. Unsystematic risk represents more than 90% of the total risk experienced by the vast majority of self-insurance groups. Price volatility in a self-insurance group has much to do with internal factors, because the group can spread unsystematic risk only across its membership. This outcome agrees with Ligon and Thistle (2005), who argue that policyholders in a small mutual retain substantial amounts of unsystematic risk because the mutual can spread this risk only across its membership. In brief, self-insurance groups enjoy the benefit of insulation from market influence at the price of higher unsystematic risk.

In particular, the five groups composed of employers in the construction industry experienced higher price fluctuations than did the market over the corresponding sample period—but they also had a less-than-one beta value. Even though they confront very high occupational risk in the construction sector, these employers enjoy lower systematic risk because they have arranged GSIAs to retain their WC loss exposure. In theory, high-risk employers should choose conventional insurance over group self-insurance because conventional insurance transfers the financial responsibility for WC losses to carriers. In reality, commercial insurance products may fall out of favor among high-risk employers due to the escalating, burdensome costs of WC insurance coverage. High-risk organizations may leave the commercial insurance market and adopt alternative risk financing approaches for their WC liability, such as group self-insurance. The advantage of insulation from insurance cycles may fuel certain high-risk employers' decision to self-insure for WC risk on a group basis. Otherwise, it would probably be economically hazardous for a high-risk employer to join its competitors within the same industry in a risk-sharing pool that makes all its members liable for WC losses under the joint and several liability rule.

According to Table 3, another five group self-insurance funds—set up by governmental entities—also manifest a less-than-one beta value and low systematic risk. Public bodies such as municipalities and counties habitually pool their resources for many loss exposures, such as medical insurance, pensions, WC, etc. Group self-insurance helps small- to mid-sized governmental entities better manage their WC losses by providing the advantage of lower levels of systematic risk.

Nevertheless, both groups in the forestry sector are very sensitive to the Virginia WC market, possessing a beta value higher than two (demonstrated in Table 3). Two possible reasons for this follow. First, in terms of net premiums written, these two groups are relatively smaller than the other GSIAs. The total premiums contributed by the members of these two groups may be too low to accomplish the risk-sharing benefit in their individual pools. Second, these two groups have a shorter sample period of loss experience, which may further impair their ability to estimate their WC losses accurately.

All in all, the GSIAs in Virginia provide evidence that small- and mid-sized businesses can benefit from entering a risk pooling arrangement for their WC risk. Homogeneous employers—which are like-minded but too small to individually self-insure—can retain their WC risk through a group self-insurance pool, exercise better control over their own programs, and partially avoid commercial insurance cycles.

V. CONCLUSION

This empirical study uses the financial data of GSIAs in Virginia to investigate whether the risk pooling arrangements created for WC risk can offer their members stabilized costs. The evidence does not indicate that GSIAs provide the advantage of rate stability to their members. Nevertheless, thirteen out of the fifteen self-insurance groups, those affiliated with the construction, government, and trade sectors, have a less-than-one beta value. Furthermore, 80% of the self-insurance groups have less than 10% of their total risk represented by systematic risk. Since the price volatility in self-insurance groups is primarily driven by unsystematic risk, group self-insurance may partially insulate participating corporations from the volatile commercial WC market. In the aggregate, this study's findings suggest that member-owned self-insurance groups may help their participants become less exposed to systematic risk.

The empirical evidence presented in this paper has two implications for research on risk retention in the form of group self-insurance for WC losses. First, the discovery of lower systematic risk among groups highlights employers' incentive

Table 2
WC Price Percentage Change in GSIAs and the Virginia WC Market

No.	Group Self-Insurance Association (GSIA)	Industry	Mean	Std. Dev.
1	Building Insurance Association Inc.	Construction	7.14	35.80
			0.67	10.29
2	Commonwealth Contractors	Construction	1.28	22.57
			−0.46	14.18
3	Merchants of Virginia	Trade	10.29	35.48
			1.58	13.75
4	Prince William County	Government (general)	38.22	94.21
			2.14	13.93
5	School System of Virginia	Government (education)	8.73	38.38
			−0.46	14.18
6	United Contractors of Virginia	Construction	9.13	45.27
			−0.46	14.18
7	Virginia Automobile Dealers Association	Trade	5.92	33.66
			1.44	14.18
8	Virginia Association of Counties	Government (general)	34.85	52.39
			0.31	9.24
9	Virginia Commerce	Trade	6.75	44.30
			−0.46	14.18
10	Virginia Contractors	Construction	6.61	43.17
			0.48	13.67
11	Virginia Forestry Safety	Forestry	5.85	44.51
			1.04	16.29
12	Virginia Municipal	Government (general)	6.04	28.88
			1.50	16.61
13	Virginia School Boards Association	Government (education)	13.95	68.54
			−0.40	17.06
14	WCAMC Contractors	Construction	16.72	61.09
			1.55	13.18
15	Wood Products of Virginia	Forestry	14.91	71.44
			2.99	14.49

Note: The price percentage change (i.e., price growth) is calculated by $(Price_t - Price_{t-1}) \div Price_{t-1}$. WC price is measured as the inverse of the loss ratio. Below the values for each GSIA are the figures for the Virginia WC market as a whole over the same period as the existence of the self-insurance group.

to establish a self-insurance group for coping with WC loss exposure. Self-insurance groups assume the WC risk and gain control over claims. They can avoid being overcharged by insurers as a result of information asymmetry between buyers and sellers in the WC market. Participating employers may partially insulate themselves from the unsteady commercial WC market. Second, the results of this study provide evidence that even employers in the high-risk construction sector band together in self-insurance groups for their WC risk. This challenges the argument that high-risk employers are less likely to self-insure (or more likely to buy conventional insurance) due to cross-subsidization in the standard WC insurance market. In theory, high risk may encourage employers to transfer the financial responsibility of WC loss exposure to insurance carriers by purchasing conventional insurance. In practice, high risk may result in excessive premiums, or carriers may reject it outright. Because of this, certain high-risk employers may be stimulated to search for more economical alternatives to cover their WC liability. The advantage of insulation from insurance cycles helps explain the motivation to form self-insurance groups for WC risk.

Ultimately, future research based on samples from other states could complement this study and contribute additional insight into the behavior of organizations that use group self-insurance for WC loss exposure.[27] Since the implementation of WC regulations can differ dramatically from one state to another, investigation into how other regulatory jurisdictions handle group self-insurance will continue to fill out the picture of how group self-insurance operates in the United States.

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Table 3
GSIAs' Sensitivity to the Virginia WC Market

Panel 1: GSIAs by Industry

No.	Group Self-Insurance Association (GSIA)	Industry	Beta	Systematic Risk Share[a]	Unsystematic Risk Share[b]
1	Building Insurance Association Inc.	Construction	0.04	0.01%	99.99%
2	Commonwealth Contractors	Construction	0.82	26.59%	73.41%
6	United Contractors of Virginia	Construction	−0.10	0.25%	99.75%
10	Virginia Contractors	Construction	−0.45	2.04%	97.96%
14	WCAMC Contractors	Construction	0.79	2.88%	97.12%
4	Prince William County	Government (general)	0.05	0.01%	99.99%
8	Virginia Association of Counties	Government (general)	0.54	9.82%	90.18%
12	Virginia Municipal	Government (general)	0.20	1.38%	98.62%
5	School System of Virginia	Government (education)	0.81	9.02%	90.98%
13	Virginia School Boards Association	Government (education)	0.85	4.46%	95.54%
3	Merchants of Virginia	Trade	−0.66	6.48%	93.52%
7	Virginia Automobile Dealers Association	Trade	0.02	0.01%	99.99%
9	Virginia Commerce	Trade	0.71	5.14%	94.86%
11	Virginia Forestry Safety	Forestry	−2.02	54.56%	45.44%
15	Wood Products of Virginia	Forestry	−2.19	19.75%	80.25%

Note: [a] The systematic risk share is the systematic risk portion as a percentage of total risk. Total risk (σ_i^2), a combination of systematic and unsystematic risk, is the variance of price percentage changes for a self-insurance group. The systematic risk of a group is calculated as beta squared times the variance of market price percentage changes ($\beta_i^2\sigma_m^2$). [b] The unsystematic risk share is the unsystematic risk portion as a percentage of total risk.

Panel 2: GSIAs by Size

No.	Group Self-Insurance Association (GSIA)	Industry	Net Premiums Written	Beta
2	Commonwealth Contractors	Construction	37,290,210	0.82
12	Virginia Municipal	Government (general)	18,287,527	0.20
8	Virginia Association of Counties	Government (general)	13,099,183	0.54
10	Virginia Contractors	Construction	8,572,884	−0.45
7	Virginia Automobile Dealers Association	Trade	7,291,353	0.02
9	Virginia Commerce	Trade	6,769,083	0.71
6	United Contractors of Virginia	Construction	6,646,439	−0.10
1	Building Insurance Association Inc.	Construction	6,290,353	0.04
14	WCAMC Contractors	Construction	6,118,012	0.79
4	Prince William	Government (general)	5,527,140	0.05
5	School System of Virginia	Government (education)	5,420,735	0.81
3	Merchants of Virginia	Trade	3,970,444	−0.66
13	Virginia School Boards Association	Government (education)	2,240,196	0.85
15	Wood Products of Virginia	Forestry	1,940,705	−2.12
11	Virginia Forestry Safety	Forestry	1,642,909	−2.02

Note: The statistics for net premiums written are from the 2007 fiscal year for all GSIAs except the Building Insurance Association Inc., which uses a figure from 2006.

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ENDNOTES

1. Source: multiple editions of *State Workers' Compensation Laws*, published by the U.S. Department of Labor. The year 2006 was the U.S. Department of Labor's last year compiling and publishing this information.

2. A self-insurance group is the same as a group self-insurance association or a group self-insurer, among other terms. All these terms are used interchangeably with "self-insurance group" throughout this work.

3. There are two segments to the alternative risk transfer market: risk transfer through alternative carriers and through alternative products. The market for alternative carriers consists of self-insurance, captives, risk retention groups, and pools (Holzheu et al., 2003). Self-insurance can be arranged individually or on a group basis. The term "risk financing" is used interchangeably with "risk transfer" throughout this work.

4. Smith and Stutzer (1990a) argue that the customers of mutuals share risks that the firm has not diversified away.

5. This statement is based on the incidence rates of nonfatal occupational injuries and illnesses by industry and case types, from 1994–2008. Source: the Bureau of Labor Statistics of the U.S. Department of Labor.

6. Self-insurance represents about three-quarters of the total alternative risk transfer market, and it is most prevalent for WC risk (Holzheu et al., 2003, p. 17).

7. In his survey, Smith (1983) indicates that only eighteen states had passed statutes allowing group self-insurance as of early 1981. He argues that the major impediment to the growth of self-insurance pools has been the lack of enabling legislation. That is, regulatory constraints to forming self-insurance groups used to be the main hindrance prior to the 1980s.

8. Source: Daniel N. Price, "Workers' Compensation: Coverage, Benefits, and Costs, 1979," *Social Security Bulletin*, September 1981, Vol. 44, No. 9. Workers' compensation (WC) is the oldest social insurance program in the U.S.

9. The WC regulations for each state can be found in the *Analysis of Workers' Compensation Laws*, published annually by the Statistics and Research Center of the U.S. Chamber of Commerce.

10. Only North Dakota and Wyoming do not allow individual self-insurance. Group self-insurance is not permitted in the following thirteen jurisdictions: Alaska, Delaware, the District of Columbia, Idaho, Indiana, Nebraska, New Jersey, North Dakota, Ohio, Vermont, West Virginia, Wisconsin, and Wyoming. For details see *State Workers' Compensation Laws*, published by the U.S. Department of Labor, or see Chang and Weiss (2011).

11. Source: *Workers' Compensation: Benefits, Coverage, and Costs, 2008*, published by the National Academy of Social Insurance in September 2010. WC benefits are payments to injured workers and to providers of their medical care, and these payments come from three parties: private carriers, state funds, and self-insurers. The top fifteen states in terms of WC benefits paid are California, New York, Illinois, Pennsylvania, Florida, Ohio, Washington, New Jersey, Georgia, North Carolina, Texas, Michigan, Virginia, Minnesota, and Wisconsin.

12. In the 1980s, regulatory deregulation and employers' demand for innovative insurance methods led to a new mutual type of group self-insurance platform. The author is grateful for these viewpoints, contributed by a host of state officials in February 2007: George Knehr (chief of the Self-Insurance Division of the Pennsylvania Bureau of Workers' Compensation), Tom Murphy (associate commissioner of the Maryland Insurance Administration), Lester Schott (insurance director of the Maryland Workers' Compensation Commission), Janis Bunce (supervisor of the Financial Regulation Division of the Virginia Bureau of Insurance), and May Beth Woods (director of self-insurance on the New York State Workers' Compensation Board). In particular, on February 26, 2007, Woods shared her observations about the WC market in New York. Although New York permitted the mutual form of group self-insurance quite early, less than ten pools existed prior to the 1980s. Around the 1990s, the number of pools increased dramatically, primarily due to the efforts of insurance brokers and administrators who successfully marketed group self-insurance for WC liability.

13. Harrington and Niehaus (2000, p. 404) assert that small- to medium-sized employers, which are prevented from self-insuring on an individual basis, self-insure on a group basis. Welch (1994, p. 233) contends that group funds are an

attractive alternative, especially for smaller businesses in many states. Group self-insurance positively contributes to the self-insurance ratio in a state (Butler and Worrall, 1993; Carroll, 1994; Smith, 1983).

14. The Virginia Workers' Compensation Act was enacted on March 21, 1918. Since then, individual self-insurance has been allowed in Virginia. The legislation relating to group self-insurance associations was enacted in 1979.

15. Vaughan (1997, p. 324) notes that self-insurers can exercise a greater degree of discretion regarding which claims are paid and which are contested. Rejda (2011) documents the advantages of self-insurance—such as control of claim handling, incentives for risk control, long-term cost savings, and increased cash flow. Chang and Weiss (2011) provide a detailed explanation of the advantages and disadvantages of self-insurance. The primary driver for self-insurance is lower costs that mitigate inefficiencies in the WC insurance market. Disadvantages include more employer responsibilities, the lack of a tax deduction for premiums, and the possibility of a worse-than-expected loss experience.

16. That is, under the *joint and several liability rule* several people may be responsible for the injury (Rejda, 2011).

17. In general, a board of trustees (directors) representing all members bears responsibility for all operations of the self-insurance group. If the group is very large, the board is selected by group members.

18. Various service providers (e.g., a claim manager, an actuary, an attorney, and an accountant) team up to make each GSIA a viable institution. This flexible network structure is supervised by the group members, and the service providers' renewal contracts are reevaluated periodically. Put simply, service providers can easily be replaced if their performance fails to meet group members' expectations.

19. Akerlof (1970) applied the "lemons" principle, arguing that "bad" products drive "good" products from the marketplace if information is asymmetrically distributed between buyers and sellers. He pioneered the research on asymmetric information by conceptually classifying consumers using the "good"/"bad" dichotomy. Scores of researchers use this type of framework to model adverse selection and asymmetric information (e.g., Rothschild and Stiglitz 1976; Smith and Stutzer 1990a, 1995; Dionne and Doherty 1994; Ligon and Thistle 2005). Dionne and Doherty (1994) proposed an alternative model to address adverse selection and commitment, taking into account evidence from California that suggests some automobile insurers attract the portfolios of predominantly low-risk drivers. Smith (1983) depended on one self-insurance group in Pennsylvania to explain why this new risk management tool was chosen, and how the program was designed to ensure solvency by the actuarial methodologies.

20. Ligon and Thistle (2005) documented the existence of mutual insurance by two theoretical explanations: conflicts of interest among agents and the participatory nature of mutual insurance policies.

21. Moral hazard also plays an important role in the formation of risk pooling arrangements. For instance, Lee and Ligon (2001) suggest that the optimal size for risk pooling arrangements may be defined by moral hazard.

22. Puelz and Snow (1994) reject the hypothesis that high-risk firms receive contracts subsidized by low-risk firms in the insurance market.

23. The systematic risk facing self-insurance groups measures the responsiveness of groups to a change in the price growth of the market. Systematic risk is attributable to market factors that affect all firms, while unsystematic risk is attributable to firm-specific events.

24. Total risk (σ_i^2), a combination of systematic and unsystematic risk, is the variance of price percentage changes for a self-insurance group. The systematic risk of a group is calculated as the beta squared times the variance of market price percentage changes ($\beta_i^2\sigma_m^2$).

25. Two inactive self-insurance groups are not included in the sample because their financial data is unavailable. The ad hoc data offer was received on March 13, 2009. According to the author's discussion with Janis Bunce from the Financial Regulation Division of the Virginia Bureau of Insurance on October 13, 2010, only one GSIA (Virginia Coal Producers) in Virginia history was unable to meet its obligations and had to rely on the Uninsured Employers' Fund to pay its open claims. In addition, Reciprocal of American, which became insolvent, was a risk retention group—not a group self-insurance association. The Bureau specifically disclaims responsibility for any of the analyses, interpretations, or conclusions in this paper.

26. The beta value provides a relative measure of systematic risk, which is attributable to market factors that affect all groups. The author also calculated beta values using the difference between price growth and risk-free rates for each group and the market. The outcomes are not statistically different from the findings shown in Table 3.

27. In reality, the author also tried to collect data on group self-insurance in several other states, including New York, Maryland, Pennsylvania, and New Jersey. Data from those states are either unavailable due to confidentiality requirements or inconsistent among groups. The data from Virginia are the most comprehensive and consistent for all groups.

STRATEGIC PRICING DECISIONS FOR SMALL RETAILERS: CONTRIBUTION MARGIN PRICING

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INTRODUCTION

Recommendations for managerial decision-making are known to often be dependent on the context in which the decisions are to be made. Blair and Boal (1991), for example, have shown that making decisions in the context of health-care organizations is influenced by specific characteristics that cause them to be unique in certain ways. Also, Armstrong and Kotler, (2011) give the example of dynamic pricing, an approach by which airlines and online retailers "…adjust prices according to market forces". These companies find that by "instantly and constantly" adjusting prices, the Web sellers can keep flexible for Internet consumers. Over the past few years, many businesses have taken strategic approaches to setting their prices. Dell Computer, for example, ties its prices very closely to the costs that its suppliers will experience at forecasted levels of output (McWilliams, 2001). Many other corporations, including retail chains, are using computerized data bases and sophisticated software to set prices based on trends, regions, test prices, discounts, and other such factors (Keenan, 2003 and Armstrong and Kotler, 2011). Some of these strategic approaches that are used by chain retailers, e.g., comparing data from widely scattered facilities, are not suitable for small retailers because many small retailers have only one facility and sell only in a small geographic market. Small retailers, however, can use other approaches.

Pricing decisions in the context of small retailer operations may be very constrained because the financial resources of small retailers are often limited. Starting a small retail business "locks-in" an owner/manager to a specific set of operations that cannot be easily modified. Resources cannot be easily switched to other applications, and modifications of operations are often too expensive to consider. This means that an analysis of a small retailer's revenues and expenses should be careful to include such factors as the recovery of initial investment and its related opportunity costs in addition to its variable and fixed costs. Even after such costs have been recovered, modifying operations may not be a viable option. If a small retail firm begins to have financial problems, basic survival may quickly become the main focus.

This article presents a pricing approach using contribution margin pricing that is useful when a retail firm has reached and is beyond its financial break-even point. This approach involves setting a price that may be charged for a product in relationship to the variable costs associated with adding this product to the retail mix given a retailer's context specific circumstances. Contribution margin pricing, hereafter termed pricing at the margin (P@M), is a well-known concept, e.g., used by Wal-Mart (Stetz, 1992). Although P@M is a simple concept, many small retail store owners or managers may not be aware of its full implications.

This article's approach to P@M can help to improve strategic pricing decisions for small retailers. Given that the retailer has reached a minimum return on investment, this article's approach can be useful for such objectives as attracting new customers, retaining existing customers, or just being downright competitive. The P@M approach is especially useful when a small retailer has excess capacity, such as excess floor space or shelf space.

BREAK-EVEN AND THE CONTRIBUTION MARGIN

There are several types of break-even analyses. For example, financial break-even analysis includes fixed and variable costs, tax effects, as well as the repayment of initial investment and opportunity costs, whereas, cash break-even analysis includes only the retailer's fixed and variable costs. In either analysis, however, the components of the contribution margin (price and variable costs) play an integral part.

This article uses the cash break-even analysis because the concept is most appropriate for those retailers that are beyond their financial break-even point; that is, earning a return equivalent to a like-kind investment with similar risk. The context is especially relevant to small retailers that wish to maximize sales with existing resources.

Cash break-even analysis (commonly referred to as operating cash flow analysis) is an especially useful place to start in considering P@M because it leads to an understanding of the practical meaning of the contribution margin. Explanations of break-even are not usually framed in the special context of small retailers, but any manager readily understands the need for a product's selling price to be higher than its associated variable costs.

For clear explanations of the fundamentals of P@M, most approaches consider a single product with a variable cost that has a constant value (Dunne, Lusch and Carver, 2011, Perreault, Cannon and McCarthy, 2011 and Stanton, 1975). As will be seen, this approach is particularly suited to understanding the relevant aspects of P@M, which can then be modified as needed for practical applications. Using this (classical) approach, revenues for a retailer can be thought of as total

units sold times the price of those units which includes a given mark-up, e.g. 35%, which represents an aggregate value for all items in the mix. For a given level of sales, there are three types of costs, i.e., 1) the costs associated with buying the good directly (often termed cost of goods sold or CGS) and 2) the variable costs (VC) associated with selling the items such as electricity, labor, advertising and the like. In addition to these costs is 3) fixed costs of the business, such as those associated with store fixtures, some utilities expenses, and rent or fixed payments. Thus, in calculating the profit for an enterprise, one would determine the Total Sales less Cost of Goods Sold to determine the Gross Profit or Gross Margin. To determine the Gross Margin (Mark Up or MU as a percent), Gross Margin (Gross Profit) is divided by Total Sales. Then one would deduct the Variable Costs associated with these revenues to determine the Contribution Margin (CM or earnings before fixed costs). This figure is derived from two main drivers – the Mark-Up amount associated with the basket of goods sold and the Variable Costs that are associated with these sales. CM is a key figure not only in understanding break-even, but also in understanding the degree to which sales contributes to fixed costs and ultimately, the amount of earnings before interest and taxes (EBIT) that would be generated given the MU and VC. Once EBIT is determined and interest and taxes are deducted, the net profit or loss for the enterprise may be determined. (See Income Statement, Figure 1)

Many managers may not have considered the implications of combining variable costs (VC) in a strategic manner with the concept of a product's contribution margin (CM), which is a product's sales (P x Q) minus its cost of goods sold (CGS) minus the variable costs (VC) associated with selling the product (CM = Sales – CGS – VC). The contribution margin provides a way to implement the idea that as each unit of product is sold, a set amount of revenue can be reserved to pay fixed costs. Some planners conduct their analysis in terms of the contribution margin as a way to assure that provisions to pay variable costs are automatically included (Groth & Byers, 1996).

CONTRIBUTION MARGIN AND VALUE CREATION

The concept of the contribution margin "…is critical in the creation of value. Understanding and grasping its significance supports the understanding of a host of issues." (Groth & Byers, 1996). A particularly important point is the fact that a product's contribution margin represents the amount of money that can be used 1) to pay the firm's fixed costs and/or 2) to add to or make profits. The first priority must be to use the contribution margin amount to pay for fixed costs because profits cannot be realized until all costs are paid. As products begin to be sold, therefore, all contribution margins are applied to fixed costs until these costs have been covered. This reflects the well-known concept of the break-even point, which means that enough units have been sold so that their contribution margins will add up to enough money to pay for the retailer's fixed costs plus the product's total variable costs at that level of units sold (BEP = TFC – TCM = 0). Once the break-even point for a certain level of sales is reached, the contribution margins from all further sales can be applied to taxes, interest, and then profits. All this is well known to managers, but many may not have considered its full implications. Once fixed costs are paid, managers have a great deal more flexibility in setting a product's price because profits are affected only by the relationship between prices, cost of goods sold, and variable costs. This means that a product can contribute to profits as long as its price is greater than its CGS and VC because the retailer is past the break-even point. Managers, therefore, have the latitude to reduce their prices, i.e., raise the value (on certain products) to attract customers or to be competitive. Small retailers should consider the strategic implications of the idea that once a firm is beyond its break-even point, profits *can be increased* through reduced prices. These reduced prices serve to give better value to customers by offering the same benefits for less money. And, a "same for less" positioning strategy is a "winning value proposition" for retailers and customers alike because, basically, everyone likes a good deal. (Armstrong & Kotler, 2011).

FIGURE 1

Income Statement		YR x
Sales		$130,000
	Cost of Goods Sold	**($84,500)**
Gross Profit		$45,500
Mark Up % (Gross Margin)		*35%*
	Variable Costs Advertising	**($2,600)**
	Other Variable costs	**($13,000)**
Contribution Margin (CM)		$29,900
CM %		*23%*
	Fixed Costs	**($16,800)**
EBIT		$13,100
	Taxes	**($3,275)**
NET Profit		$9,825
*** % of sales that flows to Net Profit		7.56%

PRICING AT THE MARGIN

The basic idea of contribution margin analysis is to evaluate an action and see if it pays back more than it costs. If the difference between price and variable costs is negative, you lose money. If it is positive, however, you make additional profit, so taking the action should be considered. Pricing at the Margin (P@M) is the process of setting the price of a unit of product higher than the landed cost of the unit and the variable costs that stem from all the activities involved in selling that one additional unit of product. Thus, setting the price higher than the variable costs marginally increases profit, i.e., total profit increases when the additional product is sold. (From this point forward in our discussion, it is assumed that the retailer is operating at or beyond its break-even point).

Break-even analysis recognizes that fixed costs must be paid. The assumption of a constant variable cost/product relationship for one product does not reflect the realities of actual retailers, which are usually selling a number of product lines and items. Insights drawn from pricing at the margin, however, can be very useful when retailers are already making profits, i.e., retailers that are beyond their break-even points. Such retailers do not have to consider how the contribution margins of their various products add up to pay for fixed costs. This means that any unused capacity can be evaluated for usage in terms of the variable costs that would result from its usage and the

prices that customers would pay. Fixed costs do not have to be considered beyond break-even because they have already been paid, so the analysis only involves the product's price, it landed cost, and its attendant variable costs.

For a retailer that has unused capacity and is past its break-even point, P@M involves simply the price that can be charged for an added product compared to its landed cost and the variable costs associated with adding that product. Because only variable costs must be considered, the price of a product can be reduced–often by a significant amount of money. Any reduced price that is greater than its landed cost and is higher than the variable costs associated with the selling of this product will result in profit when the product is sold. The contribution margin will be reduced by the amount of the price reduction, of course, but this only means that less profit (per unit) will be generated if variable costs are constant. If there is an increase in the number of units sold, there will be less profit percentage per unit, but the absolute amount of money going to profits will be increased. Furthermore, and most importantly, often times an incremental sale with have no variable costs associated with it. Thus, a retailer needs to only consider the price of the item and the landed cost associated with the item. This is where P@M can be very powerful and can be used strategically.

AN EXAMPLE

Take, for example, a retailer that is approached by an organization that wants to buy a case of play dough to be used in summer camp. The going retail price for one can is $3.85 and the landed cost of the item is $2.50 (CGS) giving this product a mark-up of 35%. A case consists of 24 units. To extend the cost and price of the item to a case price, the case would cost $60 and the selling price will be determined by the retailer based on their mindset of their mark-up requirement and how competitive they wish to be. Often times, retailers are locked into two mindsets when pricing a product. One is that retail managers may feel that they have to get a pre-determined markup (such as 35% on cost) no matter what. Even if their landed costs are above that of the competition, they still will set their prices at that margin. Second, small retailers need to understand that a retail firm must be price sensitive, especially to key items or brands that are well recognized in the local market area. For instance, in a rural area where crafting is popular, one can be assured that most people in the community would know the price of Red Heart Yarn, which is a staple in making quilts. If a firm is not competitive in the pricing of this product, customers will quickly go elsewhere. In this event, not only does the retailer lose a customer but also earns the reputation of being over priced. "If competing retailers have the same product (brand) at much lower prices, the retailer will lose a substantial amount of business. This is important, because it is far more expensive to generate new customers than to retain existing customers. Once the buyer realizes that the product is overpriced, it may be too late to adjust pricing, and the selling window may be nearly closed." (Hoffman, 2013). So rather than earn a little less profit by being price competitive, they stay with the higher price and lose customers. (This rigidity with prices has caused many a down fall for small retailers competing against large, national chain stores.)

Returning to our initial example of play dough, various scenarios are laid out in Fig. 2. In the first example (Ex.1), one can see the retail price of $92.31 for the case, and a usual mark-up of $32 or 35%. It may come as a surprise to the reader, that the mark up (Gross Profit) and contribution margin (CM) are the same at 35%, but, this is a key point. In reflecting on this example, one quickly realizes that the variable cost (VC) associated with

EXHIBIT 2

Income Statement	YR 1	Ex. 1	Ex. 2	Ex. 3	Ex. 4
Sales	$130,000	$92.31	$85.71	$75.00	$66.67
Cost of Goods Sold	($84,500)	$60.00	$60	$60	$60
Gross Profit	$45,500	$32.31	$25.71	$15.00	$6.67
Mark Up % (Gross Margin)	*35%*	*35%*	*30%*	*20%*	*10%*
Variable Costs					
Advertising	($2,600)	0*	0	0	0
Other Variable costs	($13,000)	0*	0	0	0
Contribution Margin (CM)	$29,900	$32.31	$25.71	$15.00	$6.67
CM %	*23%*	*35%*	*30%*	*20%*	*10%*
Fixed Costs	($16,800)	0*	0	0	0
EBIT	$13,100	$32	$26	$15	$7
Taxes	($3,275)	$6.5	$5.1	$3.0	$1.3
NET Profit	$9,825	$25.8	$20.6	$12.0	$5.3
% of sales that flows to profit	7.56%	28.00%	24.00%	16.00%	8.00%
Gross Margin (Mark-up)	35%	35.00%	30.00%	20.00%	10.00%

* Negligible or zero per unit basis

this one transaction is practically $0. For instance, an existing employee, who could easily take the time to place the order, would incur negligible or no incremental costs in association with the sale. The same could be said about utilities, etc. Thus, the only cost associated with this transaction is the landed cost of the item – the cost of the good sold (CGS). Once a retailer realized this, one can imagine the latitude that arises in pricing in this case, and if pricing above the CGS, a very wide range exists indeed. In the second and third examples (Ex. 2 and Ex. 3), different mark ups were used to show the amount of profit that would flow directly to the bottom line. As long as the retail price is greater than the CGS, the retailer is generating a profit. This is what is meant by pricing at the margin (P@M). In the fourth example (Ex.4), a markup of only 10% is used. It can be recognized that profit is being generated even as this price level. What is very interesting, given the issue of no variable costs, is that the percentage of the sale that flows to the bottom line is 8% ($5.30/$66.67), which is a greater amount than what normally occurs in day-to-day operations at many retail stores. Now, compare Ex. 1 to Ex. 4 and notice the per cent reduction in sale price versus the per cent going to profit. The sale price was reduced from $92.31 to $66.67, which is a $25.64 or a 27.8% drop. This percentage price drop range of almost 28% indicates the amount of latitude a retail manager has to lower a price (once the store is past break-even) and still make a decent profit. In the example a retailer could even lower the price more, if necessary, and make some profit.

COSTS AND UNUSED CAPACITY

The primary strategic consideration in P@M is to increase profits in terms of the absolute amount of money generated by using a retailer's full capacity. A retailer's fixed costs that are associated with any unused capacity are paid for by reaching break-even, but the unused capacity is not contributing to the profits of the business. To apply P@M in general to all types of small retailers, the term "unused capacity" is taken to mean different things to different retailers. Of course, all retailers have overhead costs, such as manager's salaries and insurance, that can be seen as unused capacity when they could be used to support higher levels of operations. Retailers' fixed costs include unused selling space, selling space too large for the customer flow, productivity of employees not fully utilized, or fixtures and product assortments that are not maximizing sales per square foot. As a retailer implements P@M on a new product, the retailer needs to remember that the costs that are relevant are the landed cost of the new product and the possible variable costs that maybe associated with it. However, as mentioned above in the example, the variable costs are equivalently zero. In some cases variable costs per unit may even decrease as sales increase, which would increase the contribution to profit per unit sold. For example, if productivity of employees is not fully utilized, a retailer may increase its sales by fully utilizing its employees. As a result, variable costs per unit may actually fall, and when these costs fall, incremental contribution to profit would increase.

Service retailers, like restaurants and hotels, have certain fixed levels of capacity, such as the number of tables in a restaurant and rooms/beds in a hotel whose capacity to serve during a given time period is lost forever when idle. More importantly, incremental profit during idle time is also lost forever. In order to counteract this unused capacity and make the idle time more productive, off-peak pricing is used by service firms. These firms lower their prices during "down times" to reflect the variation in demand for their supply of services (Kerin, Hartley and Rudelius, 2013).

MANAGERIAL STRATEGY

From a strategic viewpoint small retail managers should recognize that P@M might involve a lower price, and, respectively, a lower percentage of return for the additional incremental unit of sales. However, and most importantly, there would be an incremental increase to overall profits, all other things being equal.

Unfortunately, some small retailers feel comfortable only when they are getting their full mark-up on all sales. For example, many retailers use the "keystone" markup method, which means that the retail price is set by doubling the product's cost, i.e., the markup is double the cost (100% on cost or 50% of the retail selling price). With the keystone markup method, a product that costs $10 will be priced at $20. But, say that an incremental unit of the same product costing the same ($10) is marked up to only $18 in a P@M situation. This does not mean that the retailer is losing 20% ($2) of a keystone markup. It means that the retailer is getting an extra $8 of profit from a sale that would not have been made, otherwise.

Actually, it may be desirable to adjust prices at the margin to be very close or even equal to the relevant costs for another reason. In considering the strategic impact of a business's activities, any sale that a retailer makes is a sale that a competitor does not make. Furthermore, this action is at no cost (nor profit) to the retailer who implements this P@M strategy. However, taking sales volume away from competitors means that the competitors lose customers, profits, and financial strength, especially if the lost sales continue for a period of time. In the case of retailers who implement this approach, this would mean increased store traffic, which often increases sales of all types of products–even those at full mark-up.

In some cases more traffic in a store will even make a store seem more popular and a more desirable place to patronize. This popularity image is most likely for retailers that provide entertainment, but any type of retailer may suffer an adverse impression if a customer sees only a few other customers in the store. Customers in a restaurant normally do not feel comfortable if they are the only ones eating at the time because of the negative interior ambiance of the facility (Dunne, Lusch and Carver, 2011).

CONSIDERATIONS AND CAUTIONS

Strategic use of P@M is recommended for small retailers that are making profits and want to acquire new customers, keep existing customers, or to be very competitive because unused capacity is available. P@M can be used by a retailer that is not

already making a profit, also, but the mechanics of doing so often require complex calculations. Managers should recognize that other strategies are better for retailers without profits. Competing for customers through low prices usually requires economies of scale and operational efficiencies that are difficult for small retailers to achieve, although some small businesses do compete on the basis of low prices. However, if you truly understand the concept as portrayed, retailers can compete on price given they use the principles correctly.

For many retailers variable costs may increase as the incremental level of service or sales increases. For example, if a retailer is fully utilizing the productivity of its employees, a sustained increase in sales would require additional staffing. As a result, variable costs would actually increase rather than remain constant. Managers, therefore, when setting prices at the margin for incremental increases in sales need to consider the possible increase in variable costs, i.e., the number of units sold and the price will need to be more than or equal to the employee's required pay.

Another consideration involves the number of new customers that using P@M might attract. If the number is greater than the unused capacity can serve, the retailer may have to turn away customers. This is especially detrimental if any current, full price customers cannot be served properly. The number of new customers may be controlled by increasing the reduced price, but a price increase may be difficult or impossible if those prices are specified by advertisements, contracts and/or coupons. In any case there is a need to closely track the number of new customers in terms of the unused capacity available to serve them.

Also, retail managers should recognize that P@M could be dangerous for any business if it leads to a price war. Price wars are usually detrimental to all involved in competing businesses. It is especially dangerous for a small retailer to provoke a larger one into a price war because of the larger firm's greater resources and potential retaliation. However, it is the authors' opinion that a retailer must be price competitive. In other words, if a large retailer is selling a national name brand paper towel at $1.29, the small retailer needs to match that price, especially because it is a highly recognizable item and most shoppers do remember its price. If not, the small retailer will gain an image of being too expensive. It is further argued that once the concept of P@M is understood, this mindset will help the small retailer realize that he can meet "large company" prices and still be generating profit. One caveat to meeting equally low prices is that the retailer must be buying from a competitive wholesaler or distributor. If the costs of the goods are too high, the use of P@M becomes a moot point, and the retailer either needs to find another distributor or join a national buying organization.

MARKET SEGMENT PARTITIONING

Strategic use of P@M may also be used in the identifying new market segments of potential customers that can be partitioned from current customers. Decisions about how to partition market segments will vary widely and according to context-specific circumstances. Furthermore, determining the type of partitioning that will be accepted by current customers may be difficult. Nevertheless, a retailer may approach segmentation of customers in the following three general ways: By (1) adjusting the price while leaving variable costs unaltered, (2) retaining the customary price but absorbing incremental costs, or (3) changing both price and variable costs.

Segment pricing focuses on partitioning customers who are price sensitive. Although this can present challenges, many small retailers are already successful in partitioning for pricing purposes. The primary factors used for partitioning can generally be based on time, type of customer, or location.

Many restaurants, for example, partition customers on the basis of time of the day by charging lower prices on the lunch menu than on the dinner menu for basically the same meal (product). Some restaurants are staying open very late, i.e., Wendy's, in order to reach new segments of customers. Movie theaters also use segmented pricing based on time when they offer the same movie at matinee prices versus nighttime prices. (Armstrong and Kotler, 2011) Time differences are a generally used segmentation basis for partitioning that customers will often accept as fair and ethical. Patrons understand time differences, so even when they know about the lower prices, they may not resent or demand such lower prices for themselves. In some cases, however, current customers may not be so accepting.

Other general bases for partitioning customers for price differences include location and type of customer. Partitioning by retailers on type of customer is often done by age, e.g., discounts for children and senior citizens. Restaurants may give discounts at slack times to certain types of customers depending on why they are patronizing the store, for example, for birthday or retirement parties or for discussion groups. Such discounts increase patronage at times when patronage ordinarily is at low levels.

Partitioning on the basis of location may be difficult for small retailers because they tend to be tied to a specific trading area. However, retailers sometimes use partitioning on the basis of directed promotion. For example, large urban newspapers often have different editions for different parts of their coverage area and will allow advertisements that pertain only to a limited part of the area. Small retailers could place discount coupons in close geographic areas from which the firm does not draw customers, currently. Many motels and hotels place coupons in magazines, newspapers, and specialized publications such as a free "Traveler's Tips" in a highway convenience store in the hopes of reaching travelers who are first time visitors.

One of the customary ways to offer reduced prices is through the use of coupons. Managers are cautioned to thoroughly understand the need to control coupon use. They should not be used until managers decide on such issues as expiration dates, no reproductions, and limitations such as one-per-purchase or one-per-customer.

Sometimes new customers may be reached through a new (to the retailer) type of advertising medium. For example, college students are more likely to read their college's newspaper than

the local town's newspaper, so a discount coupon may be put in one or the other newspaper to reach the group that is not composed of current customers.

As an alternative to reducing prices, a retailer may consider keeping prices the same but absorbing small incremental costs, i.e., increase in variable costs, to attract new customers. The retailer absorbs the small increase in variable cost. For example, a local retailer that sells furniture may be able to compete for customers who live too far away to be regular customers by paying for the delivery costs. This technique is called freight-absorption pricing, and it is used to penetrate new markets or to hold on to increasingly competitive markets. Armstrong and Kotler (2011). Amazon.com uses this technique quite a bit, and they call it "free shipping". In the service sector, restaurants may offer a side order at no extra cost (during a given period of time) or offer free gasoline when a certain dollar amount has been purchased.

CONCLUSION

This article presents a pricing approach using contribution margin pricing or pricing at the margin (P@M) that is useful when a retail firm has reached and is beyond its financial break-even point. Retailers that are past break-even and apply P@M to utilize capacity better may experience a number of benefits. Among the benefits of P@M is that it is very likely to attract new customers, retain existing customers, and if applied properly, can aid in identifying and segmenting market segments more precisely. Although the new customers may be attracted to the store because of the lower price point on a particular item, a possible outcome of P@M, they will be exposed also to other aspects of the retailer that comprise its competitiveness with the regular customers. For example, customers may experience other product offerings, the special atmosphere and the service level of the retailer. By using P@M, a retailer can increase overall profit per square foot by offering the customers a better value.

There are several considerations and cautions with the use of P@M, but the effective use of P@M means that the ROI can be expected to increase, along with the retailer's overall financial stability. The spread of small business computerization means that the financial data required for P@M is increasingly available for informed managers. The prospects are that managers of small retail businesses will become more effective, in general. P@M is a strategy that will be increasingly used, especially by small retail firms.

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TOWARD UNDERSTANDING INVESTMENT DECISIONS AND THE IMPORTANCE OF FINANCIAL ACCOUNTING IN THE ROARING TWENTIES

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INTRODUCTION

Do investors have suitable guidance in making decisions and, for instance, preventing their own failures during Panics on Wall Street? While the outcome of the current crisis on Wall Street is still indeterminable, looking at examples in history may help in understanding the nature and development of investment decision making. Toward this end, this study looks at books on investing published in 1926 to determine what kind of guidance was provided investors at that time and what, if any, role financial accounting played in that guidance. The lessons learned from a different era may help place in perspective current conditions.

In particular, books on investing published in the United States from 1926 were identified by searching WorldCat (2008) using the key words "investing," "security analysis," and "financial statement analysis." This approach provides a reasonable method of sampling books on investing through time. Previous studies examined earlier books published from 1888 through 1925. This study extends that research another year forward in time, adding further evidence on the development of investing practices and the use of financial accounting information in those practices.

The books identified from WorldCat (2008) were *Testing before Investing* by Edmond Lincoln; *Practical Hints on Investing Little or Much* by Ben Franklin, Jr.; and *Investing Money* by Moody's Investors Service.[1] These books were obtained and examined for this study. After a brief review of earlier works, the following several sections present reviews of the books in this study and in the process provide a perspective of the state of the art of investing and the use of financial accounting information in 1926. The final section contains a summary and concluding remarks.

SOME EARLIER WORKS

Using the same search terms noted above, *The Art of Investing* by John F. Hume (1888) was the earliest book identified from WorldCat (Janson and Thompson, 2003). It and other early books were usually general and advised investing in bonds. *Investing for Profit* by G. C. Selden (1913) was the first book identified that emphasized investing in stocks (Janson and Thompson, 2005). His investment strategy included low-priced, sound common stocks such as growing railroads. Selden was a proponent of quantitative measures including margin of safety or excess of earnings over interest payments, earnings yield, dividends yield, and the ratio of operating expenses to gross earnings. Others like Escher (1914) also suggested the use of similar ratios while Babson (1914) advised buying stocks in a depression and selling them and buying bonds in a boom (Janson and Thompson, 2004 and 2009). Moody (1925) employed this same business cycle strategy while emphasizing diversification, security ratings by investment services such as his own, and economic facts. Moody also provided advice in a qualitative way on the fundamental analysis of bonds and stocks. Even more detailed guidance as to fundamental analysis in selecting stocks and bonds was presented by Herschel (1925) including the distribution of company income available for interest and dividends and times interest earned, along with some quantitative guidelines. Smith's (1924) primary thesis was that investments in common stocks outperformed investments in high grade bonds over long periods of time, even in periods of increasing purchasing power of the dollar and when other factors were favorable to bond investments (Janson and Thompson, 2009). He attributed this success to the reinvestment of earnings by corporations. Van Strum (1925) found similar results though there was a slight advantage to bonds under ideal conditions for bond investment.

Gann (1923) gave very specific advice on a method to select securities based on the historical patterns of stock prices and their corresponding volume (technical analysis). Through identifying trends in the suggested charts portraying price and volume, Gann believed that it was possible to emulate the actions of the successful market makers. His methods were antithetical to fundamental analysis (Janson and Thompson, 2009). In contrast, Pomeroy (1925) derided technical analysis as illogical arguing that such an approach would only make sense if all conditions in the past were the same as current conditions. Thus, Pomeroy (1925) took a fundamental analysis approach based on the company and the economy and even suggested a valuation model built upon a company's earnings and asset values that could be used to select stock investments. Colver, Robinson, and MacArthur (1925) argued that timing the business cycle and trading for major moves was the best stock investment strategy. Cameron (1925) largely echoed this strategy with added emphasis on the leading of the business cycle by stock prices.

Thus, based on this survey of books on investing, it was in the 1910s continuing into the 1920s that common stocks were first considered legitimate investments. However, some authors such as Clay (1915) and Sanders (1917) continued to recommend bond and similar investments (Janson and Thompson, 2005 and 2011). In addition, Duncan (1924) suggested equipment obligations that protected the holder from other creditors of

a railroad. Low, Dixon and Co. (1922) emphasized general considerations in investment decisions such as safety, income, marketability, regularity of payments, and enhancement of capital. However, rather than providing advice on the selection of securities, they encouraged investors to search out professionals, such as themselves, to make the decisions (Janson and Thompson, 2009). The following reviews of books published in 1926 extend this research stream in understanding the development of investment decisions and the related use of financial accounting information.

TESTING BEFORE INVESTING BY EDMOND E. LINCOLN (1926)

Edmond Lincoln presented sequences of tests for analyzing investments in securities. He provided tests for all securities and then added additional tests depending on the type of security and the industry of the issuing company. His treatise was aimed at "salaried men," or (p. 5) "…the average American employee of a large corporation who has a margin over the necessities of life, but not enough to justify taking chances."

In the first chapter Lincoln addressed "Who Should Invest?" He cautioned that before purchasing corporate securities, an investor should accumulate sufficient amounts in a savings bank, in insurance, and in US government bonds. Another overriding stipulation was that an investor should seek advice from a banker or a reputable investment firm. Nonetheless, Lincoln's premise was that an investor needed (p. 4, italics in the original) "…*correct information* and *sound judgment*." He hoped that his book would help in fulfilling these needs. In his introductory chapter, Lincoln also briefly described bonds, preferred stocks, and common stocks, noting that common stocks were the riskiest for a given corporation. He added that while a salaried man should focus on investing in bonds, investments in preferred and common stocks were helpful in maintaining the purchasing power of an investment when encountering an increasing cost of living.

Lincoln expanded on his idea on getting competent advice in Chapter II, "How to Start Right." He suggested consulting local bankers, long-established investment firms, financial columns from newspapers, financial services such as Moody or Babson, ratings books including those published by Moody and Poor, Better Business Bureaus to expose questionable firms, and lists of investments made by insurance and savings banks. He followed this chapter with one on "How Not to Start." Here, he urged investors to be leery of get-rich schemes such as those in the oil and gold mining industries. Lincoln advised (p. 14): "*Real facts from reliable sources are always available somewhere. Get them*, and get them *before*, not afterwards."

The heart of Lincoln's book started in Chapter IV, "Guideposts for the New Investor." Here, Lincoln began to describe the principles and measures that an investor should consider after getting advice but before investing. He stated that an investor should never buy a security that was rated lower than "Baa," or, in other words, securities rated in the lower portion of the category (p. 16) "Sound, but not Highest Grade."

Lincoln next described his (p. 17) "Tests for EVERY Security." These included six elements: safety of principal, certainty of income, rate of return (not too high), marketability (in case of emergency), diversification (not only by company, but by industry), and stability of market price (avoiding those companies with price changes due to their own situation as opposed to market-wide effects). Additional considerations given were (pp. 21-23) "*Never purchase a security which is not listed*," "*Never buy securities of a new company*," "*Would my bank take this security as collateral*," "*The Character and ability* of the men running the enterprise," and "*Analyze the record of past performance* shown in the company's *financial reports*." He added that an investor should (p. 23) "Watch the *trend* of significant financial items." These included total earnings (i.e., revenues), net profits, current ratio of usually at least two, net worth excluding goodwill, and, Lincoln added, (p. 25) "*Consider the future of the concern*" and "*Know something about the line of business."*

Chapter V was entitled "Are Bonds as 'Good as Gold'?" Lincoln pointed out that while bonds were (p. 27) "…the best form of investment for the man of moderate means," there were risks involved and in some cases the common stock of some companies were safer than the bonds of other companies. When considering an investment in bonds, Lincoln suggested the following tests beyond those that he described for every security: security of the bond, prior claims against the company, protective restrictions, number of times fixed charges were earned (should be at least two for interest and the trend of this over time was important), proportion of bonds to bonds and stock of a company (should be less than 30 to 35 percent for an industrial, 50 to 60 percent for a railroad, and 60 percent for a utility), maturity (bonds due in less than 10 years were less subject to market effects given their maturity value but be aware of call features), and convertibility into common stock.

Lincoln in Chapter VI considered "Should the Small Investor Buy Stocks?" Lincoln noted again that some stocks could be safer than some bonds and that preferred stock was safer than the common stock of the same company. He likened stock ownership with being a partner in a business. His tests for every stock beyond his tests for every security were then described. These included the following seven items: preferred versus common (higher returns for the latter but riskier in liquidation and price), amount of senior securities in capital structure (referring to his earlier guidelines discussed under bonds), number of times dividends were earned should be at least two, market price should be about ten times earnings available for dividends, book value per share (though it could vary and he did not provide any numerical guidelines), disregard extra dividends and stock dividends, and avoid buying the stock of mining and oil companies.

In the next five chapters Lincoln addressed utilities, railroads, industrials, foreign bonds, and real estate bonds. He began with Chapter VII, "What Public Utilities Have to Offer." Lincoln included as utilities light and power, gas companies, and electric street railways. He advised against investing in a local utility since its securities had a limited market and noted that utilities required a large capital outlay and its earnings might not lead

to large dividends, especially since utilities were regulated by commissions. He suggested ten tests for utilities, especially applicable to light and power concerns: territory (population, number and types of customers) and length of franchise; capacity and output including the ability to sell power at off-peak times; sources of revenue with special caution of street railways which Lincoln believed were on the decline (both for competitive and political reasons); expenses such as labor, interest, and commodities; management; valuation of plant and whether security prices reflect this value; the use of holding companies that reduced the usefulness of balance sheets for assessing value; components of combined utilities; large distribution costs of hydro-electric stations; and public and labor relations.

Chapter VIII was "What Governs the Value of 'Rails'." After noting that railroads dominated the security markets at the turn of the century and before, Lincoln explained that they provided "complete" information on a monthly basis as required by the Interstate Commerce Commission. He added that in his time railroads were making a comeback though historically they had had numerous failures. He described six tests before purchasing a railroad security which he grouped under physical factors, income factors, and capitalization factors. The three physical factors were territory and type of traffic, traffic density (i.e., tons of freight carried one mile compared with miles of road), and trainload and carload (capacity and trend over time). The two income factors were trend in freight and passenger revenue and trend in expenses. For the latter, Lincoln recommended calculating the operating ratio or ordinary expenses to gross revenue. He believed that this ratio should be about 60 to 70 percent. He would go a further step and break-up ordinary expenses into transportation and other, maintenance of way, and maintenance of equipment. For these items, he suggested appropriate percentages as 50 to 55 percent, 20 percent, and 20 to 25 percent, respectively, of ordinary expenses. The capitalization factor was bonds and stock outstanding per mile of road. He also recommended, as an additional test, one and a half to two for the number of times interest and dividends were earned.

The subject of Chapter IX was "Points to Consider before Buying Industrials." Since industrials tended to be riskier than utilities or railroads which usually had ready markets for their goods and services, Lincoln recommended only buying the stock of industrials that provided necessities and that had survived business contractions. Moreover (p. 54) "…*a company which is just being formed is nothing more than a gamble*." He also noted that the value of a trading company depended upon its earning power while that of a manufacturer depended to some extent on its physical assets. On the other hand, the goodwill for a trading concern was likely to have a more certain value than that of a manufacturer. His tests for industrial securities included: stability of business (necessities without a style component preferred), competition (leader in an industry preferred); governing factors (price and supplies of raw materials and customer base); and financial set-up. The latter included inventories (watch build-ups and obsolete items), receivables (short-term accounts receivable preferred to notes receivable), plant items (size of investment and danger of over capacity), borrowed capital (the less the better), and goodwill (should be ignored).

Lincoln explained "How to Pick Foreign Bonds" in Chapter X. He noted that some of bonds of foreign governments were safer than company bonds and that they may yield a higher return than a comparable American security. His tests for a foreign government bond were the stability of the issuing government, likelihood of war, past payments of debt, security including source of revenue, budget, tax situation, and per capita amounts of debt, income, and taxes, purpose of debt such as public improvements, country source of wealth, and, warning, that there was little recourse in the event of default.

Chapter XI was "Weak Spots in Real Estate Bonds." Here, Lincoln was leery of such investments given that the underlying value of the real estate may not be observable or appraised conservatively. Lincoln's test, and in some cases, warnings, included the following items. First, he noted that real estate bonds may have limited marketability. Next, he noted that property values may be overstated and that a bond should be for no more than 50 to 60 percent of property value. Because of the uncertainty of appraised values, he recommended gauging value based on actual cost in normal circumstances. His fourth test or caution was that new construction was speculative since things could go wrong. He also noted that prices could be manipulated and that real estate markets could go down like other markets. Lincoln added that prices could be a consequent of temporary conditions such as war and construction on credit could suffer if there was a depression. He was also cautious of guaranteed bonds commenting that the ultimate value depends upon the property itself. Finally, building and loan associations may offer a good alternative for a small investor as long as its management was sound and there were not significant penalty payments for the withdrawal of funds.

Chapter XII was "What Economic Influences to Watch." Lincoln first advised to buy a bond based on its current yield rather than based upon a subsequent price increase to par. In addition, he discussed two broad factors that had only a limited bearing on specific securities. The first was the 'Influence of the Business Cycle." He briefly described the cycle of depression, recovery, prosperity, crisis, decline, and back to a depression. While he admitted it was better to buy when stock prices were low and sell when high, he advised the small investor to focus on buying a "sound" security with a "safe return." The other broad factor was "Long-Time Trends" such as inflation and the industrialization of America. Here he advised following the recommendations of a "trained economist" and, more generally, to (p. 72) "…*buy good securities with a satisfactory income whenever he has the money*."

In his final chapter, "How to Buy Bonds and Stocks," Lincoln gave some brief guidance on how to actually buy a security. He first suggested finding a "reliable house" to make the transactions if an investor's bank was unable to do so. He added that some bond houses offered baby bonds in denominations of less than the usual $1,000. Lincoln pointed out that the investor need not buy right away but should get advice from the house as to possible investments and then analyze them using the tests

described previously in Lincoln's book. Lincoln also included information regarding delivery of securities and commissions. Lincoln concluded his book with a glossary divided into three parts: bonds, stocks, and general.

Thus, Lincoln provided a fairly comprehensive approach for an investor whether investing in stocks or bonds, though he recommended seeking professional advice. Lincoln not only mentioned specific items and ratios to check but also provided quantitative guidelines. Many of his suggestions hinged upon financial statement items. Lincoln also commented on economy wide factors, though he essentially said that it was hard to time the market and investors should buy securities when money was available to do so.

PRACTICAL HINTS ON INVESTING LITTLE OR MUCH BY BEN FRANKLIN, JR. (1926)

Ben Franklin was commissioned by the Colorado National Bank to prepare a treatise on investing that could be appropriately offered to the bank's individual customers. *Practical Hints* was the product of that commission. Franklin initially discussed savings accounts, life insurance, and home ownership before securities. Briefly, his first prescription was to establish a savings account as the individual's primary investment. At least $1,000 should be accumulated before any other investment was contemplated. Life insurance was presented as a cornerstone of a prudent financial plan. Insure early in life while insurability was high and premiums were lower. Like banks, the author advised selecting large and well established insurance companies. Home ownership was Franklin's next recommendation. He explained that rental value dictated intrinsic worth and favored home investments that could justify their cost based on capitalized rental value. Franklin acknowledged that banking industry standards accepted up to 70% financing for home ownership, but recommended a much more conservative approach. He preferred that 100% of a home's purchase price be first saved, but accepted 50% financing as an upper limit. If home ownership was achieved through financing, the borrower's first and foremost financial objective should be to pay off the debt as quickly as possible.

The author also opined that mortgage loans to homeowners could be excellent investments; requisite care must be exercised though in the choice of loan sourcing agencies. For investments of this type, Franklin recommended an upper limit on loan to value of 60%. Likewise, loans on income-producing properties warranted consideration if sponsorship was strong, but loans on vacant land or unproductive properties were dismissed as pure speculation.

Turning to securities, Franklin emphasized the critical importance of selecting the very best bond dealer available. In his experience, unreliable, undercapitalized and inexperienced bond dealers considerably outnumbered the reputable firms with which he would consider doing business. The strength of personal recommendations received from bankers and trusted bond dealers was Franklin's preferred vetting method. The selected bond dealer should then be used exclusively to source all of the individual's investments. Greater selection and more careful servicing were benefits expected from a highly reputable bond dealer. Once a bond dealer was selected, the investor must still personally review all proposed investments. As the bond business had flourished, many bond houses had become distribution centered organizations and the individual must personally assure that the house recommendations were indeed suitable for him.

Franklin eschewed portfolio churning, advising instead that investors buy and hold carefully selected securities. On the assumption that many of his readers were holders of U.S. Government issued Liberty Bonds, he strongly discouraged liquidation and reinvestment schemes (p. 48): "Hold on to your Liberty Bonds" was his emphatic advice. He also favored municipal bonds that were issued as direct obligations of the issuing entity for purposes of general infrastructure improvement by established cities of greater than 5,000 population with average or below average outstanding debt loads and not dependent upon a single industry. Special assessment bonds, on the other hand, were the realm of experts and should be avoided by the average investor. Bond issues of foreign governments and enterprises were mentioned as possibly attractive investments, but these warranted extra diligence to gauge political stability, and the moral and business character of the issuing entities.

Franklin's fundamental investment test was to assess the earning power of the property that the issuer intended to acquire with the bond proceeds. Quoting Professor Fisher, he observed that value was derived from income, and not income from value. He was strident in the opinion that earning power can only be assessed from the earnings record (p. 57): "No estimate of earnings based on the performance of other properties or on the expectations of engineers, accountants, promoters or other human beings is worth very much." Franklin advised that, for projects in stable industries such as utilities, earnings should be at least twice the amount required to fully service all interest charges; for firms operating in more volatile environments, a higher times interest earned ratio would be desirable. Corollary to the primacy of earnings history as an evaluative investment metric was the observation that new enterprises without earnings history could not be considered investments; they were "speculation[s]". The only safe investments were those in the issues of established enterprises that display adequate and sustained earnings records.

Analysis of potential investment issues was primarily an exercise in comparison shopping. Franklin's preference was for large issues that were widely held; their relative liquidity and price stability were valuable attributes. From among qualifying investments, he prescribed the comparative evaluation of similar bonds. Those that appear to be priced lower than their comparables were probably defective in some fashion and should be avoided.

Franklin recommended careful study of Moody's *Analysis of Investments*, Poor's *Manuals*, or the card system of The Standard Statistics Co. The standardized formats for disclosure and the rating systems that these services provided were invaluable to the do-it-yourself individual investor. The data so gleaned were then to be subjected to systematic analysis. Franklin provided

an annotated bibliography of texts, handbooks, and self-study courses that the aspiring investor might profitably consult.

In a cautionary chapter, Franklin described the "Earmarks of Fraudulent Promotion". His own long experience as a compulsive student of investment advertising programs provided the basis for his prescriptive analysis. He observed that solicitations for legitimate investment opportunities typically arrived with little fanfare in plain, even boring, standardized circulars, while scams were generally packaged in stylish fashion and hyped to the hilt. The promoter's target was invariably the small investor and his siren song was to denounce the Wall Street establishment while offering a "ground-floor" opportunity to the little fellow who would answer the call. An insidious practice of the unscrupulous promoter was to offer an accompanying guarantee of investment performance, often underwritten by the very company whose securities were being foisted upon the unwary. The use of high and mighty sounding company names was also a tell-tale trademark of the sharp promoter.

Franklin opined that blue-sky laws and commissions, legislated to protect the individual investor, increased the costs of commerce and tended to dull the natural wariness of those who they were designed to protect. On taxes, he lamented that ever more burdensome taxation policies drove the wealthy to tax-free government bonds and, in the process, encouraged extravagant municipal spending while simultaneously starving legitimate industry of needed financing. The quotation (p. 92), "Taxation in itself is one of the greatest of social evils for it takes away from the 'Forgotten Man' the just rewards of his industry and thrift," aptly summarized Franklin's position on the topic. On the possibility of securities regulation on the Federal level, he echoed Sturgis' skepticism in *Investment: A New Profession* (p. 94): "Would it be possible to propose anything worse for the investor or the country than to have a governmental body, swayed by politics, pass upon the soundness of investments?"

The diversification practices of institutional investors were cited as a prudent template for individual investors as well. On the other, fascination with business cycles, all the rage among academics and sophisticated investors, was debunked as a reliable forecaster of securities prices. Franklin advised the prompt placement of funds as they became available, but scolded that the incurrence of debt to ever fund an investment program was sheer folly.

Securities prices did fluctuate and Franklin cited interest rate instability as a major cause. He left it to learned economists like Irving Fisher to explain the instability. Near maturity bonds fluctuated less wildly than did perpetual stocks and the stock volatility was at least partially attributable to interest rate effects. Franklin acknowledged that many factors influenced stock prices, but opined that, at least in the popular press, interest rate volatility was given short measure. Speculation played a vital role in Franklin's view. Its actors stabilized markets and provide liquidity, but could not be thought of as investors. The margin investor, in Franklin's opinion, was just one step away from speculator status.

On stocks as investments, Franklin departed from the still common conservative mantra that only bonds could qualify. He readily acknowledged the greater risk in stocks, but observed that stocks of stable companies with solid earnings histories could satisfy his investment criteria. Not surprisingly, these top-shelf stocks offered little in the way of yield advantages over first-class bonds. On the other hand, quality stocks did offer purchasing-power protection in the face of rising commodity prices, while the lack of such protection might be viewed as the Achilles heel of a purely bond portfolio strategy. Franklin's practical conclusion was to invest in both bonds and stocks, diversifying purchasing-power as well as other intrinsic investment risks. A second advantage of stock investments was the compounding of undistributed earnings that they provided.

Timidity, carelessness and speculation were, to Franklin, the three prevalent shortcomings that characterized most investors. Inexperience breed timidity, and professional counsel was often not sought out; Franklin admonished that reputable bond houses welcomed the small investor and assured that the smaller customer should expect and would receive good service. Carelessness was common among all sorts of individual investor classes and that attribute created a fertile field for blue-sky peddlers. As insurance against his own readers' carelessness, Franklin advised transacting business with only the best institutions. To speculate was human nature, which Franklin acknowledged. Diligent attention to sound fundamentals of analysis was the prescribed antidote.

Franklin's *Practical Hints* was a concise and accessible guide to investing, well positioned in the growing speculative fever of the mid-1920s, to encourage sound fundamental principles of investing. His assiduous abstinence from margin debt, purposeful diversification construct and insistence on sustained earnings histories for candidate investments, should have served investors well in both the immediately succeeding period and subsequent decades.

INVESTING MONEY BY MOODY'S INVESTORS SERVICES (1926)

This pamphlet made the case for an independent source of information in making stock and bond decisions and then described such services that were offered by Moody's. Moody noted that people who were otherwise successful often lost their accumulated wealth through investing. Moreover, relying upon a bond salesman or other security seller was not helpful since they had a financial stake in the investors' decisions. Failures occurred not only among small investors, but by (p. 4) "… the largest capitalists, savings banks, insurance companies, etc…" Nonetheless, Moody argued that (pp. 4 -5) "The place of greatest safety in the world for investment capital really is in Wall Street." What was needed was (p. 5) "…independent and unbiased advice and guidance in order to achieve success." It was exactly this need, according to Moody, that was fulfilled by Moody's Investors Services that began in 1909. The "foundation stone" of this service was integrity or (pp. 7 -8) "…honesty, impartiality, independence and incorruptibility."

The pamphlet went on to describe the 12 parts to the service. The service built upon three ratings books, collectively called *Moody's Analyses of Investments*, covering steam railroads, public utilities and industrials, and governments and municipals. They provided the (p. 9) "…latest and average earning power over a series of years, financial condition, margin of safety of the security issues, etc…." The securities were rated from the highest grade "Aaa" to the lowest grades. The second part of the service entailed sending four textbooks to subscribers: *How to Invest Money Wisely* by John Moody; *How to Analyze Railroad Reports* by John Moody; *Sound Investing* by Paul Clay; and *How to Analyze Industrial Securities* by Clinton Collver.[2] The third part involved an analysis of the investor's security holdings with respect to diversification and (p. 10) "…suggest ways of strengthening the principal while maintaining or adding to the income." The fourth part allowed the investor to inquire in person or in writing about particular securities. The fifth part was a "Bulletin Service" whereby Moody's mailed information about any of the subscriber's holdings as it was obtained. The next part was a weekly newsletter covering (p. 10) "…current developments, such as the war situation, the money market, politics, crops, trade influences, and in short anything which has any bearing on the bond or stock markets." Moreover (p. 10), "It also brings to light the factors which foreshadow pending changes in prices for both stocks and bonds." The seventh part was a supplemental weekly analysis focusing upon a particular corporation or group. The eighth part was devoted to bonds (p. 11): "Frequent reviews and forecasts of the bond market are issued, as well as regular analyses of new investment issues." The ninth part was the "Monthly Business Barometer" that (p. 11) "…shows in statistical form the fundamental changes in trade and industry from month to month." The tenth part was the "Monthly Quotation Record" showing (p. 11) "…the monthly quotations of all stocks and bonds, where such quotations are available, whether listed or unlisted, and also shows the yields on the latest prices, etc…." as well as ratings for each security. The "Monthly Reports of Earnings" contained (p. 12) "…the latest reports of earnings, both gross and net, of all the properties analyzed and rated in the annual volumes…" The final part was the "Investors' Record Book" which an investor could use to keep track of his securities along with (p. 12) "… dividend and coupon dates, sinking fund payments, etc." The service cost $140 per year.

Thus, by 1926 through Moody's Investors Services investors could obtain a comprehensive look at individual securities, economic assessments, and forecasts of trends. Information was updated frequently and in some cases even on a daily basis. Moody's approach went a step further than Lincoln's (1926) or Franklin's (1926) approaches in that an overall security rating was provided. Like Lincoln and Franklin, Moody's used financial accounting information in their analyses. Economy wide factors were also considered.

SUMMARY AND CONCLUDING REMARKS

This study examined books on investing that were published in the United States in 1926. Two of the books, Lincoln (1926) and Franklin (1926), gave advice on selecting securities. The advice included financial ratios such as times interest earned and more generally earnings and other financial accounting information. Moody (1926) described a valuable investor resource available at the time.

The most comprehensive approach for selecting securities was presented by Lincoln (1926). He suggested several different types of corporate and other investments for a "salaried man" with excess cash to invest. Lincoln believed that the "salaried man" should concentrate on buying bonds though stocks should also be part of his portfolio. Among the many tests suggested by Lincoln were quantitative benchmarks for times interest earned, times dividends earned, and the ratio of the value of bonds to bonds and stock. Lincoln, like Herschel (1925) before him and Graham and Dodd (1934) after, was one of the early authors to provide quantitative benchmarks. He also described other sources of information such as rating services, financial publications, professional advice, and touches on economic indicators as well as the stage of the business cycle. With respect to the latter, perhaps Lincoln was not cautious enough when he advised, subject to recommendations of economists and long-term trends, buying "good" investments when an investor had the money.

Franklin (1926) focused on the demonstrated earning power of a company whether the investor was interested in bonds or stocks. He, too, provided a quantitative benchmark of at least two for times interest earned. Less specific than Lincoln (1926), Franklin nevertheless identified several additional important aspects of investing. These included dealing with a reputable bond dealer, purchasing issues of large issuers that were readily marketability and that offered price stability, using investment services, the importance of interest rates, avoiding fraudulent schemes, not using borrowed money for investment, and diversifying. With respect to the latter, Franklin noted that a portfolio should, in addition to bonds, include stocks since they offered protection against loss of purchasing power and, like Smith (1924) noted, offered potential growth in value due to the reinvestment of corporate earnings. Interestingly, Franklin (1926) thought little of the apparently then popular attempts to time the business cycle. Instead, like Lincoln (1926), he suggested purchasing securities as money became available.

Investing Money showed that by 1926 Moody's Investors Service was providing comprehensive coverage of corporate and other securities. Not only was financial accounting data provided for steam railroads, utilities, and industrials, but the securities were given an overall rating. These volumes were supplemented by updates covering companies as well as general economic conditions. Even the particular holdings of an investor could be evaluated. Hence, to the extent information was provided and reliable, investors had available from an independent source a comprehensive aid in making investment decisions. Moody argued that his service's independence resulted in superior information to that available from investment bankers, even those that were members of the Investment Bankers Association as advocated by Rice (1926) and Ferris (1926).

With respect to the availability of financial accounting data, Wall (1926) reported that less than 70 percent of the 3,500 reports available to Robert Morris contained sales numbers and

only about 25 percent contained net income amounts. While railroad reporting did not suffer from these shortcomings because of the requirements of the Interstate Commerce Commission, it is difficult to see how a company could have been reliably assessed as an investment without sales and net income numbers. Moreover, it is questionable whether prudent investment advice such as Lincoln (1926) and Franklin (1926) tried to provide or timely information such as Moody (1926) supplied could overcome these deficiencies. These omissions could have easily misled investors and lenders on the eve of Black Tuesday, October 29, 1929, and the ensuing Great Depression.

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ENDNOTES

1. Not included in this study are two short works (Rice, 1925; Ferris, 1926) that emphasized the importance of consulting with members of the Investment Bankers Association when making investment decisions. Also excluded was *The Investing for a Widow* by Barron's (1926) that was an essay contest focusing upon a specific investment setting.

2. Works by each of these authors has been included in previous studies of this research stream.

GOLDRATT'S THEORY APPLIED TO THE PROBLEMS ASSOCIATED WITH AN ACCOUNTING FIRM GOING PAPERLESS

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INTRODUCTION

There are several problems associated with going paperless in an accounting firm. Some of which can be detrimental to day to day operations. If the power goes down and there is no back-up generator, then progress is at a standstill. Going paperless, while sometimes difficult, can prove to be very beneficial for an accounting firm. Efficiency improvement is a large benefit an accounting firm will experience if they make the move to a paperless environment. For example, it will be faster to access documents that are stored electronically. Goldratt's Thinking Process can be used to show that the process of going paperless using proper tools is not difficult.

BACKGROUND

Working in a firm that is trying to go paperless can cause an enormous amount of stress if the transition is not smooth. The firm I work for has chosen to go paperless by trial and error. This can cause several problems with staff productivity, as well as, efficiency when completing a return. I have applied Goldratt's theory to try and come up with solutions to the problems my firm is facing during this transition period.

LITERATURE REVIEW

The first step into going paperless is to make the decision to go paperless. "Often times, top managers are the hardest to convince that change is good" [LaRue,2006]. Jack LaRue also states that "[Top managers] are set in their ways and [they] are committed to [the] processes that work for them". "Change can be easier when you create a commitment starting at the top" [LaRue, 2006]. A firm cannot convert to paperless overnight. After the commitment has been made to make the move towards becoming paperless, top management will need to invest in training. "An investment in training can make all the difference when going paperless. When you train staff on the software as well as the processes [a firm] puts in place for document management, [the firm] can save countless hours of frustration later" [LaRue, 2006]. Once a firm goes paperless, it must have a system to store the electronic files safely. Peter Piazza [Piazza] states that if the "backing up process is inefficient, and not daily, it [can] create the possibility that data could be lost in a system crash or disaster". Companies that have important information, such as, social security numbers and financial information, would want all the information to be safe in case the system crashes. Some clients might not keep physical files and expect the firm to have an electronic file that can be accessed and produced later. Sylvia Hsieh [Hsieh] points out that "losing an electronic document to technological glitches or human error can be more than an annoyance". Losing an electronic document could cause a firm's client to have issues with federal or state taxing authorities. With all the problems associated with going paperless, I have used Goldratt's Theory to come up with solutions to the problems.

THE THINKING PROCESS AND THE THEORY OF CONSTRAINTS

During the 1980's, Goldratt [1992-b] wrote a book entitled "The Goal". In this book, he conveys the story of a plant manager struggling to keep his plant afloat while searching for a way to improve the plant's performance. With the help of an old college professor, the manager learns how to improve the performance of his plant while also learning a method for resolving problems to the point of a win-win situation. Goldratt's Theory of Constraints (TOC) focuses on the efficiency of all the processes as a whole rather than the efficiency of any one single process. While the TOC was developed for manufacturing through Goldratt's Thinking Process, the Thinking Process system can be used to work through many other business processes and problems.

In Goldratt's TOC, a given group of processes will have a weakest link. This weakest link controls the entire systems production rate. In order to maximize the system production, the weakest link must be improved and all other links in the processes regulated to the speed of the weakest link. The weakest link is the constraint and all steps must be examined together to determine the constraint; the core problem for termination.

Since the constraint is not always obvious, Goldratt [1992-b] developed the Thinking Process. This is a series of steps used to locate the constraint (What to Change?), determine the solution (What to change to?) and how to implement the solution (How to make the change?). These steps are actually referred to as the Thinking Process. Goldratt's next book "It's Not Luck" [1994] describes the Thinking Process in much more detail.

WHAT TO CHANGE?

If the symptoms of a core problem are undesirable effects (UDEs), then the undesirable effects are merely symptoms brought on by the core problem itself. This core problem needs to be determined and eliminated. The methodology employed in the search for a core problem is based on a cause and effect relationships. These cause and effect relationship are used to

uncover the core problem associated with the UDEs. The core problem is also the weak link in the operation when it concerns obtaining the goal of the company.

By determining the true core problem in a situation, it is helpful to write the current state in a diagram format. This diagram shows a logical explanation of the situation. With practice and logical based common sense, the major UDEs can be interconnected through cause and effect relationships in a Current Reality Tree (CRT). Creating this tool leads to the process of determining "What to Change." Goldratt [1992-a] claims, the analytical method of a CRT is used in attempting to reveal the Archimedes point – the identification of the root cause.

This analysis method also provides a tool to understand the existing nature of the cause. It does this by discussing and scrutinizing our basic intuitive sense, which exists in our environment. It is somewhat different from the management approach of correlation and classification. All past unsuccessful efforts to eliminate the undesirable effects failed to attack and eliminate the core problem. That's why the symptoms returned. In general, employees want to do a good job. They want to do what is best for the organization but don't always feel current procedures allow for core problem elimination.

UNDESIRABLE EFFECTS

According to Goldratt [1994] the first step in the Thinking Process is to develop a list of at least 10 – 12 undesirable effects that currently apply to the problem at hand.

1. The accounting personnel are not properly trained to use the database software.
2. Back-up files can be lost.
3. Going paperless can be less secure.
4. Work paper etiquette is not consistent from return to return.
5. It is difficult to create a standard that all partners will agree on.
6. Secretaries do not have the proper training to obtain access to the data storage to retrieve prior year returns.
7. All personnel lack computer skills.
8. The actual adoption of going paperless can be difficult.
9. If electricity is out, no work can be done.
10. People do not like change.
11. There is a risk of personnel corrupting the paperless file.

THE CURRENT REALITY TREE

After organizing the Undesirable Effects in an effect-cause-effect relationship analysis, a tree took shape that identified UDE # 7, **"all personnel lack computer skills"** as the core problem. The core problem will be located at the bottom of the tree with all other UDEs leading from the core problem. The Current Reality Tree is read from the bottom starting with the core problem and progressing upward through the tree using if . . . then statements in a logical order.

The tree reads as follows:

- If all personnel lack computer skills and computer skills are necessary for training in the use of new software, then the accounting personnel is not properly trained to use the database software.
- If all personnel lack computer skills and computer skills are necessary to be training in the use of new software, then secretaries do not have the proper training to obtain access to the data storage to retrieve prior year returns.
- If the accounting personnel is not properly trained to use the database software and currently, secretaries do not have the proper training to obtain access to the data storage to retrieve prior year returns and knowledge of the operations of the data base software is a major concern and importance, then the actual adoption of going paperless can be difficult.
- If the actual adoption of going paperless can be difficult and people do not like change, then it is difficult to create a standard that all partners will agree on.
- If it is difficult to create a standard that all partners will agree on and the partners all choose a different standard to work with, then the work paper etiquette is not consistent from return to return.
- If all personnel lack computer skills and lack of computer skills can cause file corruption, then there is a risk of personnel corrupting the paperless file.
- If there is a risk of personnel corrupting the paperless file and those files are not backed up, then the back-up files can be lost.
- If the back-up files can be lost and all files are kept on a paperless network, then going paperless can be less secure.
- If going paperless can be less secure and if electricity is out, no work can be done, then going paperless can be more difficult.

See Figure 1 – Current Reality Tree

WHAT TO CHANGE TO?

Once the Current Reality Tree is formed a conflict emerges and pulls the situation in two directions. The most common way of managing conflict is to compromise in some way. However, if compromise were a true solution for the problem, the conflict would have been eliminated a long time ago. Therefore the

tendency to look for a compromise to handle the situation should be overcome and the true core problem should be eliminated.

Goldratt [1992-a] stated that since a vacuum does not exist, eliminating the core problem means creating a new reality, in which the opposite of the core problem exists. To eliminate the core problem, a tool known as the Evaporating Cloud (EC) should be used. An EC, according to Goldratt [1993] lets a person precisely present the conflict facilitating the core problem and then helps find a solution by challenging the assumptions causing the conflict. The EC starts with an objective that is the opposite of the core problem. From the objective, the requirements (minimum of two) are listed. Each requirement will have at least one prerequisite. It is the prerequisite that depicts the conflict. All of the requirements and prerequisites are based on assumptions that have been ingrained into our minds over time. It is these assumptions that keep us in the conflicted environment. This is the first step in freeing ourselves from the binding controversy.

EVAPORATING CLOUD

Goldratt contends that compromising does not solve the core problem though short-term success may be realized. He suggests using the Evaporating Cloud (EC) to search for real solutions that will break the conflict that bring about a win-win solution for everyone. The core problem is "all personnel lack computer skills" so the objective of the EC will be "all personnel have sufficient tools to perform their duties." Next, we must list a minimum of two requirements. Each requirement will have at least one prerequisite. It is the prerequisites that depict the conflict. The zigzag arrow between the two prerequisites represents the conflict.

To read the EC one would use "in order to …we (they) must" syntax.

- In order for all personnel to have sufficient tools to perform their duties, all personnel must be sufficiently trained in the use of the paperless computer software, and at the same time all personnel must be able to recognize the specific needs based on the individual clients.

- In order for all personnel to be sufficiently trained in the use of the paperless computer software, there must be a standard that all partners will agree on.

- In order for all personnel to be able to recognize the specific needs of individual clients, there must be different standards that not all partners will agree on.

See Figure 2 - Evaporating Cloud

The injections in this instance are:

1. We purchase and install a generator for auxiliary back-up power.
2. We develop an in-office training manual and hold training sessions for all employees to show them the benefits of the new computer system.

This tool will logically show that once the injections are implemented, the desirable effects can be accomplished. When the EC is broken, the FRT is built using the injections from the EC. The injections are connected with the cause-and-effect logic and use clarities and insufficiencies where additional information is required. This process tests the solution and is enhanced by criticism and negative comments. If criticisms, negative comments and UDEs can be overcome by the proposed solution then this provides proof of the solution and leads to the next step in the process. This process taps into the natural tendencies of criticism and negativity.

See Figure 3 - Evaporative Cloud with Injections

HOW TO CAUSE THE CHANGE

Next consider whether the injections will direct desirable effects. An injection allows for an acceptable resolution to one side of the conflict. With the injections and the logical based common sense cause and effect relationships, the desired effects can be connected and the future outcome developed. This technique is called building the Future Reality Tree (FRT). The FRT according to Goldratt [1993] is the thinking process that enables a person to construct a solution that, when implemented, replaces the existing undesirable effects by desirable effects with out creating devastating new ones. Goldratt [1992-b] goes on to add, the analytical method of the FRT is used to construct and scrutinize such a solution.

This tool will logically show that once the injections are implemented, the desirable effects can be accomplished. When the EC is broken, the FRT is built using the injections from the EC. The injections are connected with the Effect-Cause-Effect logic and use clarities and insufficiencies where additional information is required. This process tests the solution and is enhanced by criticism and negative comments. If criticisms, negative comments and UDEs can be overcome by the proposed solution then this provides proof of the solution and leads to the next step in the process. This process taps into the natural tendencies of criticism and negativity.

FUTURE REALITY TREE

A FRT was then constructed in an effort to ensure that all of the UDEs would be eliminated using the resolution identified in the EC. The FRT is essentially the same as the CRT; however the injection(s) identified in the EC are placed into the tree to create a vision of the "future reality." The FRT is read from the bottom up using if…then statements in a logical format just as the CRT.

The tree reads as follows:

- If we develop an in-office training manual and hold training sessions for all employees to show them the benefits of the new computer system, then all personnel will have sufficient computer skills.

- If all personnel have sufficient computer skills and computer skills are necessary to be trained in the use of new software, then the accounting personnel will be properly trained to use the database software.

- If all personnel have sufficient computer skills and computer skills are necessary to be trained in the use of new software, then secretaries will have the proper training to obtain access to the data storage to retrieve prior year returns.

- If the accounting personnel will be properly trained to use the database software and secretaries will have the proper training to obtain access to the data storage to retrieve prior year returns and the knowledge of the operations of the data base software is a major concern and importance, then the actual adoption of going paperless will not be difficult.

- If we develop an in-office training manual and hold training sessions for all employees to show them the benefits of the new computer system, then people will accept the change.

- If people will accept the change and the actual adoption of going paperless will not be difficult, then it will not be difficult to create a standard that all partners will agree on.

- If it will not be difficult to create a standard that all partners will agree on, then the work paper etiquette will be consistent from return to return.

- If all personnel have sufficient computer skills and sufficient computers skills will decrease the chance of file corruption, then there is not a risk of personnel corrupting the paperless file.

- If there is not a risk of personnel corrupting the paperless files and those files are backed up, then files will not be lost.

- If files will not be lost and all the files are kept on a paperless network, then going paperless can be more secure.

- If we purchase and install a generator for auxiliary back-up power, then work can be done even when there is electric power outage.

- If work can be done even when there is electric power outage and going paperless can be more secure, then going paperless can be less difficult.

See Figure 4 – Future Reality Tree

CONCLUSION

Goldratt's Thinking Process identifies the core problem in the CRT, eliminates the core problem in the EC, and avoids compromise in the FRT by producing a win-win solution. The core problem was resolved by developing an in-office training manual and training sessions for all employees to show them the benefits of the new computer system. If this method was to be adopted by accounting firms, the accounting firms would be able to smoothly transition into a paperless process.

SUMMARY

This procedure, although somewhat different from the normal methods of analysis, is so practical, that it can be applied to any problem anywhere at anytime. According to Goldratt [1992-b], you start with an effect in reality. Then hypothesize a plausible cause for the existence of that effect. Since the aim is to reveal the underlying causes that govern the entire subject, try to validate the hypothesis by predicting what else this hypothesis must cause. Once such predictions are found, concentrate efforts to verify whether or not each prediction holds water by asking questions. If it turns out that one of the predictions doesn't hold up, find another hypothesis. If all of them hold up, continue until the entire subject is understood through the bonds of cause and effect.

Bob Fox [1989], President of the Goldratt Institute, states: "I do not believe any longer that the challenge is the technology of what to do. That has been well developed - maybe not disseminated very well yet, but developed. The issue is the resistance to change once we know what to do, and I believe there is a solution to that. This method of problem solving requires ability that everyone has and stems from the systematic methods and thinking processes. It provides you with the framework necessary to direct these efforts and to verbalize your intuition to gain a better understanding of managements "intestinal sensations."

Everyone has self-doubt. This self-doubt makes it very difficult to use the scientific method of analysis. Goldratt [1992-b] reveals, the scientific method involves reaching into the unknown; speculating a cause and determining predicted effects probably requires an awkward personality that thrives on the unknown. But we are dealing with the known, with current reality. There must be an equivalent method, a thinking process that facilitates building a current reality tree within the known, and we can effectively use it on any subject that we have intuition for and care about.

This cause and effect approach is used in many areas of Science and Mathematics. The demonstrated thinking process is what managers need the most. To carry out a successful process of ongoing improvement there is nothing more important than the ability to answer: "What to change?", "What to change to?", and "How to cause the change?". The results are well worth the required investments.

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Figure 1 – Current Reality Tree for an Accounting Firm Going Paperless

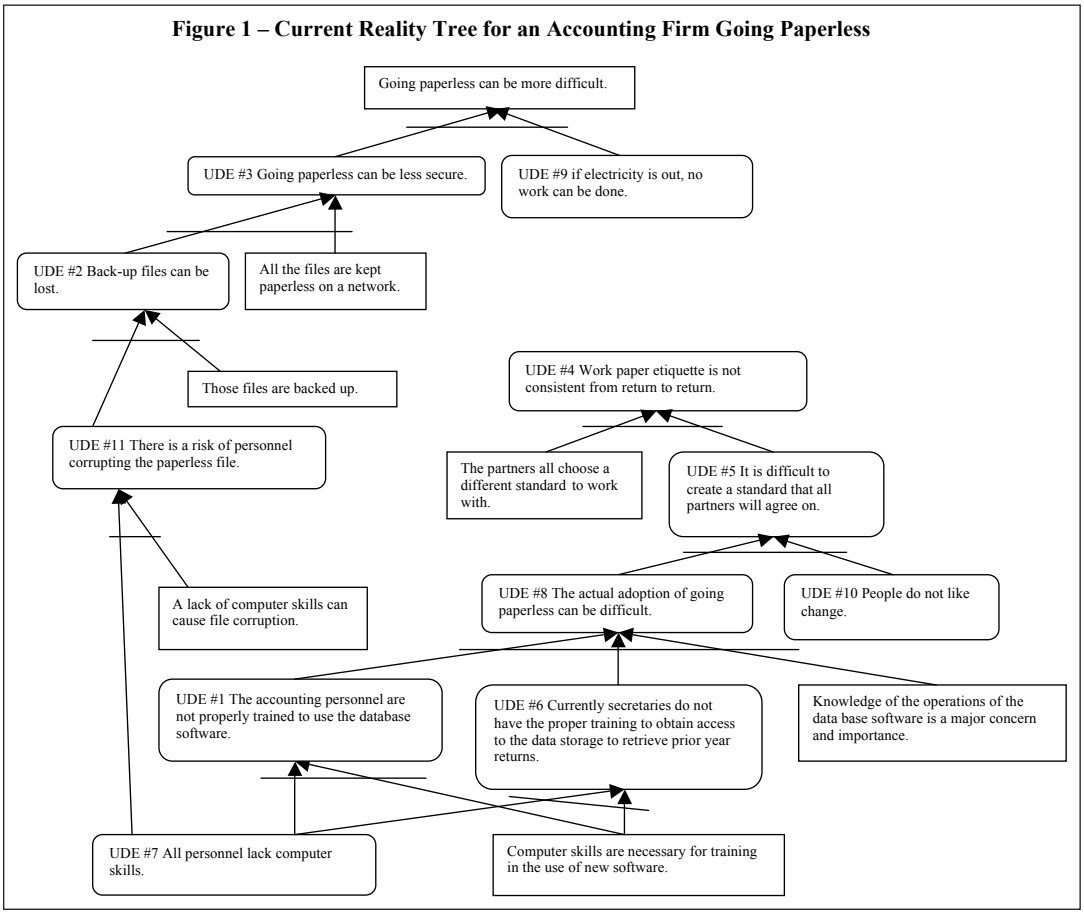


Figure 2 – Evaporative Cloud for an Accounting Firm Going Paperless

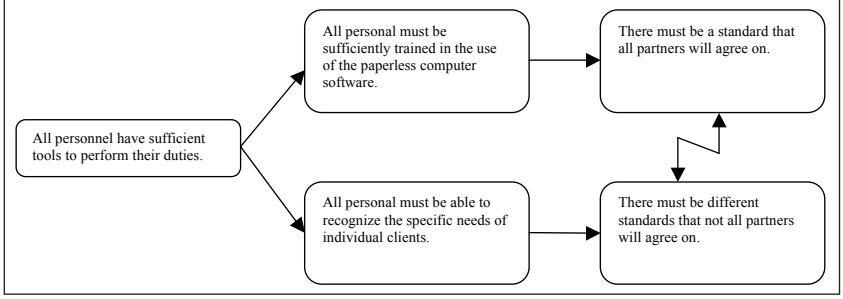


Figure 3 – Evaporative Cloud with Injections an Accounting Firm Going Paperless

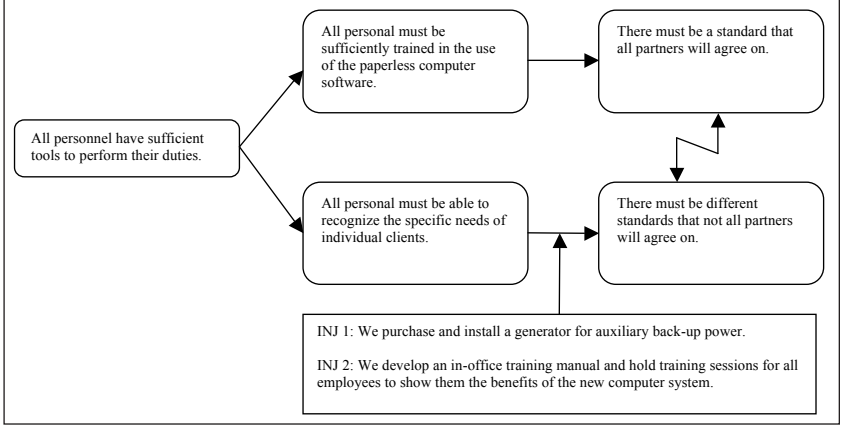
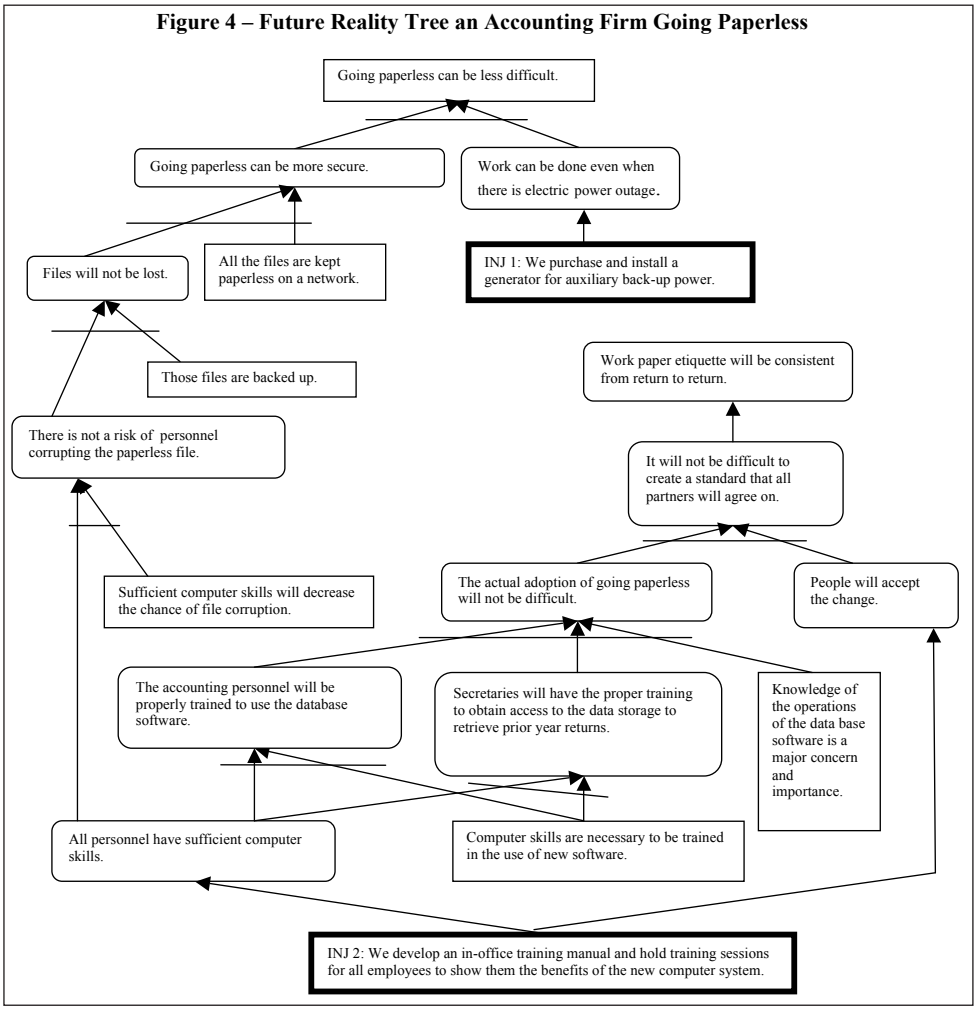


Figure 4 – Future Reality Tree an Accounting Firm Going Paperless



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